Australian Government
Australian Maritime Safety Authority

Rotary Wing Search and Rescue

STANDARDS AND PROCEDURES MANUAL

Version 8

February 2025

Forward

This document is designed to reinforce, and guide prescribed operational policies, procedures, standards, and instructions relevant to all phases of aerial search and rescue operations. Aircraft assigned to conduct search and rescue missions must meet key operational criteria and be equipped with the necessary role-specific equipment to safely complete the mission.

The goal of this document is to support the delivery of proficient, safe, and standardized operations. Successful search and rescue missions are achieved through the coordination of skills among the entire crew.

"This document does not supersede or take precedence over any policies or procedures outlined in the approved operations and flight manuals. The policies and procedures established by the company, as detailed in those official documents, shall always take priority."

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Cover: Rescue 421 from Nautilus Aviation performing SAR training, Vlassof Cay Great Barrier Reef,	Photo courtesy of Nautilus Aviation. D25/19429
Various: Images of AMSA's SAR Equipment	Photos Courtesy of AMSA
Page 92: Vessel in Distress with Occupant holding a "V"Sheet,	Photo Courtesy of AMSA
Page 101: Rescue 510 crew demonstrating a Raft dispatch procedure, QGAir Cairns,	Photo Courtesy of QGAir
Page 122: Raft trailing Seadye;	Photo Courtesy of AMSA
Page 139: Type of Cospas-Sarsat Distress Beacons,	Image courtesy of Cospas-Sarsat
Page 140: Cospas-Sarsat system graphic	Image courtesy of Cospas-Sarsat
Page 141: Footprint of a MEOSAR Satellite	Image courtesy of Cospas-Sarsat
Page 142: Footprint of a LEOSAR Satellite	Image courtesy of Cospas-Sarsat
Page 143: Footprint of a GEOSAR Satellite	Image courtesy of Cospas-Sarsat
Page 145: Ranges of the 406MHz & 121.5MHz Beacon Signals	Image courtesy of AMSA
Page 169: Aircraft Crash Scene	Photo courtesy of ATSB
Page 171: Aircraft Ejection Seats	Photos courtesy of ATSB
Page 172: Aircraft under Ballistic Parachute	Photo courtesy of ATSB
Page 173: General photos of Ballistic Parachute Handles and containers	Photos courtesy of ATSB
Page 176: Aircraft Crash Scene	Photo Courtesy of ATSB
Page 185: General photos of vessels and pollution	Photos Courtesy of AMSA
Page 193: AMSA's Emergency Towage Vessel	Photo courtesy of AMSA

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For further information contact
Advisor Standards
Response
Australian Maritime Safety Authority
GPO Box 2181
CANBERRA ACT 2601

Table Of Contents

TABLE OF CONTENTS

Document Control

DOCUMENT CONTROL

Search and Rescue Standards and Procedures Manual for Rotary Wing SAR Units

Owner	Advisor, Standards	Approved by	Manager AMSA Asset Capability
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Abbreviations And Acronyms

ABBREVIATIONS AND ACRONYMS

Acronym / Abbreviation	Meaning
A	Area or Search Area
AAIT	Aircraft Accident Investigation Team (ADF)
ACMA	Australian Communications and Media Authority
ACO	Air Crew Officer
ADF	Australian Defence Force
ADS-B	Automatic Dependent Surveillance Broadcast
AFTN	Aeronautical Fixed Telecommunications Network
AIIMS	Australian Inter-service Incident Management System
AIS	Automatic Identification System
AMC	Aircraft Mission Coordinator
AMSA	Australian Maritime Safety Authority
AMSOC	Australian Maritime Security Operation Centre
ARC	AMSA Response Centre
ASIR	Air Safety Incident Report
ASO	Air Search Observer
ATC	Air Traffic Control
ATD	Actual Time of Departure
ATS	Air Traffic Services
ATSB	Australian Transport Safety Bureau
AUMCC	Australian Mission Control Centre
BPC	Border Protection Command
C	Coverage Factor
CRS	Coast Radio Station
CSS	Coordinator Surface Search (maritime)
D	Datum
D	Diameter
DIAC	Department of Immigration and Citizenship
DFAT	Department of Foreign Affairs and Trade

Acronym / Abbreviation	Meaning
DF	Direction Finding
DSC	Digital Selective Calling
E	East Longitude
E	Total Probable Error of Position
ELT	Emergency Locator Transmitter
EMA	Emergency Management Australia
EPIRB	Emergency Position Indicating Radio Beacon
ESO	Emergency Service Operations / Organisations
ETA	Estimated Time of Arrival
ETD	Estimate Time of Departure
FCP	Forward Command Post, sometimes referred to as a Forward Field Base
Fig	Figure
FIR	Flight Information Region
FLIR	Forward Looking Infrared
FM	Frequency Modulation
FMS	Flight Management System
GHz	Gigahertz
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
GS	Ground speed
HF	High Frequency (3 MHz to 30 MHz)
HQAC	Headquarters Air Command (Air Force)
HQAST	Headquarters Australian Theatre
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMO	International Maritime Organization
Inmarsat	International Maritime Satellite Organisation
JRCC	Joint Rescue Coordination Centre

Acronym / Abbreviation	Meaning
KHz	Kilohertz
LES	Land Earth Station
LHQ	Land Headquarters (Army)
LUT	Local user terminal
m	Metres
MASTREP	Modernised Australian Ship Tracking & Reporting System
MBC	Maritime Boarder Command
MHQ	Maritime Headquarters (Navy)
MCS	Maritime Communications Station
MCC	Mission Control Centre
MF	Medium Frequency (300 kHz to 3 MHz)
MHz	Megahertz
MMSI	Maritime mobile service identity
MOD	Maritime Operations Division
MPP	Most Probable Position
MPR	Marine Pollution Response
MSD	Maritime Standards Division
MSI	Maritime Safety Information
NM	Nautical Mile
NMERA	National Marine Emergency Response Arrangements
NVD	Night Vision Device
OSC	On-Scene Coordinator
PIW	Person in Water
PLB	Personal Locator Beacon
POB	Persons Onboard
RAAF	Royal Australian Air Force
RAN	Royal Australian Navy
RCO	Rescue Crew Officer
RWR	Rotary Wing Rescue

Acronym / Abbreviation	Meaning
RWS	Rotary Winch Search
JRCC	Joint Rescue Coordination Centre
SAR	Search and Rescue
SART	Search and Rescue Transponder
SDB	SAR Datum Buoys
SDS	Stores Delivery System
SES	State Emergency Service
SLDMB	Self-Locating Datum Marker Buoy
SMC	Search and Rescue Mission Coordinator
SNR	Signal to Noise Ratio
SOLAS	International Convention for the Safety of Life at Sea
SOPs	Standard Operating Procedures
SOS-N/S/W	In AMSA context – Senior Officer Standards North, South or West
SRR	Search and Rescue Region
SRU	Search and Rescue Unit
TMAS	Telemedical Assistance Service
UHF	Ultra-high Frequency
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VT	Vessel Tracking

Glossary

GLOSSARY

Term	Definition
Australasian Inter-Service Incident Management System (AIIMS)	A nationally recognised incident management structure, used primarily by emergency service agencies to provide a common framework to manage all incidents.
All hazards approach	An 'all hazards' approach to emergency planning that is adaptable to a wide range of situations.
Aircraft Coordinator (ACO)	A person who coordinates the involvement of multiple aircraft in SAR operations.
Aircraft Mission Coordinator (AMC)	A SAR crewmember, who leads, informs, directs and coordinates the actions of the SAR aircraft and crew to achieve safe and effective conduct of the mission.
Air Search Observer (ASO)	SAR crewmember responsible for the conduct of visual searches and the deployment of life saving equipment to persons in distress via an airborne delivery system.
AMSA Response Centre (ARC)	The Canberra operations centre from which AMSA coordinates multi-disciplinary (search & rescue, environment protection, emergency towage, casualty coordination) and multi-agency (Commonwealth, States / Territories, commercial sector) responses to a maritime emergency. JRCC Australia is a core element of the ARC.
ARGOS	A satellite-based location and data collection system.
Agency	An agency means a government agency or a non-government agency
Aviation Asset Capability	The unit within AMSA's Response Division responsible for SAR contract management, SAR equipment procurement, audit and training of SRUs.
Coordination	The bringing together of organisations and elements to ensure effective search and rescue response. One SAR authority must always have overall coordination responsibility and other organisations are to cooperate with this agency to produce the best response possible within available resources.
Coordinated Universal Time (UTC)	International term for time at the prime meridian.
Cospas-Sarsat System	A satellite system designed to detect distress beacons transmitting on the 406 MHz frequency.
Coverage factor (C)	For parallel sweep searches, Coverage Factor (C) is computed as the ratio of sweep width (W) to track spacing (S). C = W/S.

Term	Definition
Craft	Any air or sea-surface vehicle or submersible of any kind or size.
Datum	A geographic point, line, or area used as a reference in search planning.
Digital selective calling (DSC)	A technique using digital codes which enables a radio station to establish contact with, and transfer information to, another station or group of stations.
Emergency Phase	Emergency phases are based on the level of concern for the safety of persons or craft that may be in danger. The three levels of emergency are classified as Uncertainty, Alert, and Distress.
Emergency Service Operation	An operation conducted by, or at the request of, an authority of the commonwealth, a state or a territory. The operation is for: a. Law Enforcement purposes, or b. The purpose of saving or protecting persons, property or the environment.
Response	The Division of the Australian Maritime Safety Authority responsible for the search and rescue function.
Fix	A geographical position determined by visual reference to the surface, referencing to one or more radio navigation aids, celestial plotting, or other navigation device.
Forward-looking infrared (FLIR)	An imaging system, mounted on board surface vessels or aircraft, designed to detect thermal energy emitted by targets and convert it into a visual display.
General communications	Operational and public correspondence traffic other than distress, urgency and safety messages transmitted or received by radio.
Global Maritime Distress and Safety System (GMDSS)	A global communications service based upon automated systems, both satellite-based and terrestrial, to provide distress alerting and promulgation of maritime safety information for mariners.
Global Navigation Satellite System (GNSS)	Worldwide position and time determination system that includes one or more satellite constellations and receivers.
Heading	The horizontal direction in degrees magnetic in which a craft is pointed.
Home Base	The major facility from which the asset/s normally operate.
Hypothermia	Abnormal lowering of internal body temperature (heat loss) from exposure to cold air, wind or water.
Indicated air speed (IAS)	The aircraft speed shown on the air speed indicator gauge. IAS corrected for instrument error and atmospheric density equals true air speed.

Term	Definition
International Maritime Satellite Organisation (Inmarsat)	A system of geostationary satellites for worldwide mobile communications services, and which support the Global Maritime Distress and Safety System and other emergency communications systems.
Instrument flight rules (IFR)	Rules governing the procedures for conducting instrument flight. Also, a term used by pilots and controllers to indicate type of flight plan.
Instrument meteorological conditions (IMC)	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima specified for visual meteorological conditions.
Joint Standard Operating Procedures (JSOPs)	A document that defines the Scope of Operations for the SAR services to be followed by the ARC during the tasking and conduct of search and rescue missions, Environmental Protection and Response missions and the support for the conduct of operations provided by Asset Management & Preparedness
JRCC	Joint Rescue Coordination Centre. The AMSA Response Centre (ARC) unit formally responsible for coordination of maritime and aviation search and rescue in the Australian SAR Region. JRCC is an entity under global SAR arrangements. It is located as a discrete unit in the ARC.
Knot (kt)	A unit of speed equal to one nautical mile per hour.
MAYDAY	The international radiotelephony distress signal, repeated three times.
MEDEVAC	Evacuation of a person for medical reasons.
Minimum Equipment List (MEL)	A document approved by CASA that contains the conditions under which a specified aircraft may operate with particular items of equipment inoperative at the time of dispatch.
Mission control centre (MCC)	Part of the Cospas-Sarsat system that accepts alert messages from the local user terminal(s) and other mission control centres to distribute to the appropriate rescue coordination centres or other search and rescue points of contact.
NATPLAN	National Plan to Combat Pollution of the Sea by Oil and Other Hazardous and Noxious Substances
NAVAREA	One of 16 areas into which the International Maritime Organization divides the world's oceans for dissemination of navigation and meteorological warnings.

Term	Definition
Night Visual Flight Rules (NVFR)	Helicopters engaged in single-pilot commercial or NVFR SAR operations do not have the same level of system redundancy as IFR equipped SAR helicopters, to safely cope with equipment failures and emergency situations.
On-scene	The search area or the actual distress site.
On-scene frequency	A dedicated SAR frequency for radio transmission within a search area, usually 123.1 MHz as nominated by the JRCC.
Personal Locator Beacon (PLB)	Personal radio distress beacon for alerting and transmitting homing signals.
Pilot-in-command (PIC)	The pilot responsible for the operation and safety of the aircraft during flight time.
Position	A geographical location normally expressed in degrees and minutes of latitude and longitude.
Positioning	Process of determining a position that can serve as a geographical reference for conducting a search.
Possibility area	(1) The smallest area containing all possible survivor or search object locations. (2) For a scenario, the possibility area is the smallest area containing all possible survivor or search object locations that are consistent with the facts and assumptions used to form the scenario.
Primary swell	The swell system having the greatest height from trough to crest.
Probability Area	The area in which a missing craft and/or survivors are most likely to be found taking into account possible errors in the navigation of the missing craft and of the search craft.
Probability of detection (POD)	The probability of the search object being detected, assuming it was in the areas that were searched. POD is a function of coverage factor, sensor, search conditions and the accuracy with which the search facility navigates its assigned search pattern. Measures sensor effectiveness under the prevailing search conditions.
Rescue	An operation to retrieve persons in distress, provide for their initial medical or other needs, and deliver them to a place of safety.
SafetyNET	Communications service provided via Inmarsat for promulgation of maritime safety information, including shore-to-ship relays of distress alerts and communications for search and rescue coordination.
SAR Datum Buoy	Droppable floating beacon used to determine actual sea current, or to serve as a location reference.

Term	Definition
Sea State	Condition of the surface resulting from waves and swells.
Search	An operation, normally coordinated by a rescue coordination centre, using available personnel and facilities to locate persons in distress.
Search and Rescue coordinating communications	Communications necessary for the coordination of facilities participating in a search and rescue operation.
Search and Rescue facility	Any mobile resource, including designated search and rescue units, used to conduct search and rescue operations. The terms unit and asset maybe interchangeable with facility.
Search and Rescue incident	Any situation requiring notification and alerting of the SAR system, and which may require SAR operations.
Search and Rescue mission coordinator (SMC)	The suitably trained or qualified official temporarily assigned to coordinate a response to an actual or apparent distress situation. In Australia, the acronym SARMC is also used in some jurisdictions. Throughout this manual, the terms SMC and SARMC are synonymous. Some jurisdictions also use the term A/SARMC to describe the SMC's assistants.
Search and Rescue plan	A general term used to describe documents which exist at all levels of the national and international search and rescue structure to describe goals, arrangements, and procedures which support the provision of search and rescue services.
Search and Rescue point of contact (SPOC)	Rescue coordination centres and other established and recognised national points of contact that can accept responsibility to receive Cospas-Sarsat alert data to enable the rescue of persons in distress.
Search and Rescue region (SRR)	An area of defined dimensions, associated with the national rescue coordination centre (ARC), within which search and rescue services are provided.
Search and Rescue service	The performance of distress monitoring, communication, coordination and search and rescue functions, including provision of medical advice, initial medical assistance, or medical evacuation, through the use of public and private resources, including cooperating aircraft, vessels and other craft and installations.
Search and Rescue stage	Typical steps in the orderly progression of SAR missions. These are normally Awareness, Initial Action, Planning, Operations and Mission Conclusion.

Term	Definition
Search and Rescue unit (SRU)	A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue operations.
Search area	The area determined by the search planner to be searched. This area may be sub-divided into search sub-areas for the purpose of assigning specific responsibilities to the available search facilities.
Search endurance (T)	The amount of "productive" search time available at the scene also known as Available Search Hours (ASH). This figure is usually taken to be 85% of the on-scene endurance, leaving a 15% allowance for investigating sightings and navigating turns at the ends of search legs.
Search facility position error (Y)	Probable error in a search craft's position, based on its navigational capabilities.
Search object	A ship, aircraft, or other craft missing or in distress or survivors or related search objects or evidence for which a search is being conducted.
Search pattern	A procedure assigned to an SRU for searching a specified area.
Search radius	The actual search radius used to plan the search and to assign search facilities. It is usually based on adjustments to the optimal search radius that are needed for operational reasons.
Situation report (SITREP)	Reports, from the OSC to the SMC or the SMC to interested agencies, to keep them informed of on-scene conditions and mission progress.
Surface picture (SURPIC)	A list or graphic display from a ship reporting system of information about vessels in the vicinity of a distress situation that may be called upon to render assistance.
Sweep width (W)	A measure of the effectiveness with which a particular sensor can detect a particular object under specific environmental conditions.
Technical Crew	A member of the SAR crew (e.g. hoist operator, rescue crew member, paramedic) other than pilot/s who is assigned to a SAR flight for the purpose of operating specific aircraft and role equipment, assisting the flight crew during the mission and attending to any person in need of medical assistance
Track spacing (S)	The distance between adjacent parallel search tracks.
True air speed (TAS)	The speed an aircraft is travelling through the air mass. TAS corrected for wind equals ground speed.

Term	Definition
Visual flight rules (VFR)	Rules governing procedures for conducting flight under visual meteorological conditions. In addition, used by pilots and controllers to indicate type of flight plan.
Visual meteorological conditions (VMC)	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima.

General SAR Procedures

1. GENERAL SAR PROCEDURES

1.1 The National SAR System

Search and rescue (SAR) is the activity of responding to tasking, locating, and recovering persons either in distress, potential distress, or missing, delivering them to a place of safety, and under controlled circumstances, returning to an operational base.

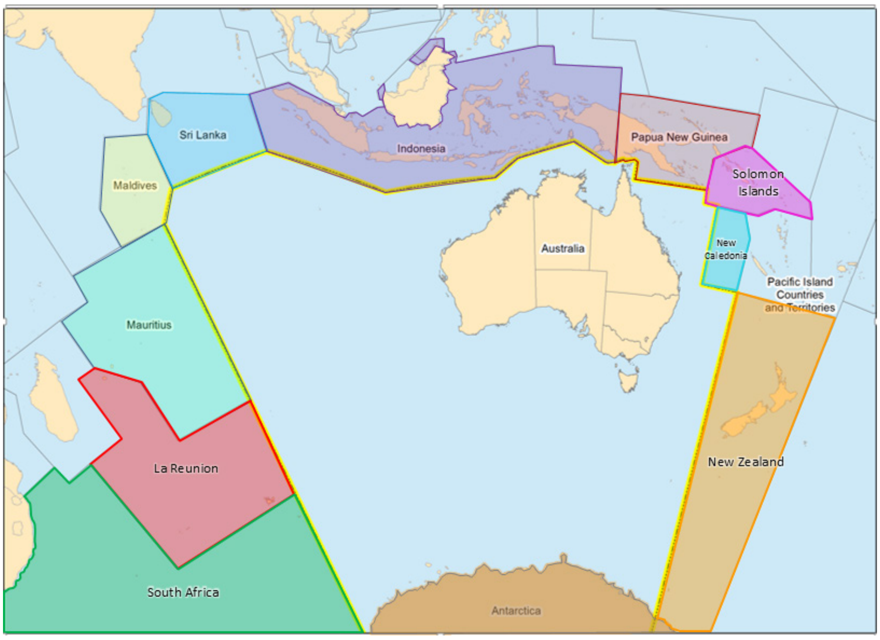
Australian SAR arrangements are designed to complement other emergency services (police, fire, ambulance, etc.) in situations where those services are unable to operate effectively. Such situations may include, for example, remote area operations, rescues at sea, or the need for specialist SAR facilities not normally available to state/territory emergency services.

Depending on the extent and complexity of the incident and the available personnel and facilities, SAR may take various forms in response to a distress situation. However, unless the action is inseparable from safeguarding life, a SAR operation does not include salvage or the saving of property.

The Australian search and rescue region (see figure below) covers the Australian continent and large areas of the Indian, Pacific, and Southern Oceans, as well as the Australian Antarctic territories. This region spans approximately 52.8 million square kilometres, or about one-tenth of the Earth's surface. Dedicated SAR assets are limited in Australia, so other government, private, and commercial assets may be diverted from their primary functions by charter, arrangement, or request.

In practice, many SAR operations are conducted jointly by Commonwealth and State/Territory authorities. Therefore, it is essential that available resources and operational techniques are standardized and coordinated across the Australian region.

Documenting standardized equipment, techniques, and procedures, this manual, along with others such as the National Search and Rescue Manual, enables SAR authorities to cooperate and coordinate most effectively. By establishing and standardizing procedures, this manual and the others listed below aim to promote the efficient saving of lives.



Australia & Neighbouring Search & Rescue Regions

1.2 SAR Manuals and Documents

The following manuals and documents will be applicable to aviation SRU operations:

- Internal SRU Operations Manuals outlining approved SAR Tactics, Techniques, and Procedures
- National Search and Rescue Manual
- AMSA Search and Rescue Service Agreement*
- SAR Standards and Procedures Manual for Rotary Wing SAR Units*
- Fastwave Voyager V3 User's Guide*
- RX3-DF EPIRB Tracking Unit Instruction Manual*

*Indicates an AMSA-produced and issued document

1.2.1 National Search & Rescue Manual (NATSAR)

The National Search and Rescue Manual is the standard reference document for use by all search and rescue authorities, emergency service organizations, and other agencies providing search and rescue services in Australia. It outlines the agreed methods of coordination through which search and rescue operations are conducted within Australia. The manual is consistent with the relevant international conventions to which Australia is a party. The manual is available online via the AMSA website.

https://www.amsa.gov.au/national-search-and-rescue-council/manuals-and-publications/national-search-and-rescue-manual

1.3 General Financial Procedures

1.3.1 Submission of Invoices

In the case of an invoice for actual search and rescue operations, it should be addressed to response.invoices@amsa.gov.au and specify the SAR incident number. AMSA will normally pay these invoices within 30 days of receipt.

For invoices related to services other than actual search and rescue operations, such as audits or AMSA-conducted training, they should be addressed to the Senior Advisor Aerial Capability – AMSA Asset Management & Preparedness and clearly marked as AMSA Training or Audit. Total engine hours accumulated during the activity are also required. The AMSA Officer attending audits will also record the hours flown.

1.4 Operational Compliance, Competency, Currency and Recency

1.4.1 Training & Oversight

Emergency Service Operations (ESO) do not confer any particular approval or authority to operate outside of the CASR. Any operator may be tasked by AMSA to attend an operational incident. To ensure all personnel are familiar with the specific mission profiles and associated risks of these types of operations, AMSA may review operating manuals and regulatory approvals of SRUs upon request.

The SRU is required to ensure that all crew members performing SAR services and functions understand their roles, the hazards involved and are competent in using all equipment (including both AMSA-provided and non-AMSA-provided SAR equipment) that they may need for SAR services. The SRU must also allow AMSA or its nominee to inspect the SRU's compliance upon request.

Where practical, AMSA will provide the SRU with an audit schedule and reasonable notice of any audits and/or search and rescue exercises or flights. The SRU must endeavour to comply with the schedule and the notice, including making the SRU's personnel available for the audit or training as reasonably required by AMSA.

If AMSA reasonably determines that a member of the SRU is not competent, proficient, or current in all duties they are reasonably likely to perform in the course of the SAR services undertaken on behalf of AMSA, AMSA may issue a notice to the SRU outlining these concerns and specifying the duties to which the notice relates.

If the SRU receives a notice that a member is not competent in accordance with the Search and Rescue Aircraft Panel Agreement, the SRU must (at its own cost):

- Provide, or arrange for, sufficient training to ensure that the specified member becomes competent, proficient, and current in the performance of the specified duties; and
- Ensure that the specified member is not required or permitted to perform the specified duties until the SRU has provided AMSA with evidence demonstrating that the member is competent, proficient, and current in performing those duties.

1.5 SRU Availability and Responsiveness

1.5.1 Daily Status Reports

The SRU is encouraged to keep the ARC frequently informed about the status of the aircraft and aircraft systems by submitting a Daily Status Report (DSR) via email to rccaus@amsa.gov.au. The SRU should also provide updated DSRs for any changes in status that may affect the performance of an AMSA tasking. Such notifications may be made by voice or email.

1.5.2 Levels of Availability

SRUs shall outline their level of mission capability within the DSR. AMSA recommends using one of three terms to clearly identify mission capability and availability:

Online:
The SRU (Search and Rescue Unit) is fully operational and available for immediate tasking. It is equipped, manned, and ready to respond to SAR taskings as required.

Online (Conditional):

The SRU is operational but may have certain limitations or conditions affecting its readiness. This could include partial equipment functionality, crew availability issues, or maintenance that impacts its full capability. It can be tasked, but its effectiveness may be reduced based on these conditions.

Offline:
The SRU is not operational and is unavailable for tasking. It is either undergoing maintenance, repairs, or other circumstances that prevent it from being used for SAR taskings. It will not be able to respond to calls until it is brought back online.

1.5.3 Response Times

Subject to the Search and Rescue Unit's obligations to supply services under its primary contract, and subject to the SRU's availability and decision to accept tasking, the SRU is required to provide the primary aircraft and crew to undertake SAR operations.

The aircraft must respond to a request as soon as practicable while maintaining a safe and efficient response.

The Pilot in Command (PIC) shall ensure that, prior to departure, the nominated crew—both pilots and air/technical crew, including observers—are appropriately qualified, briefed on the task, and understand any associated risks.

No member of the crew is to be placed under any duress to participate in a mission profile. Particular attention shall be given to selecting personnel who are appropriately trained, experienced, qualified, and current.

Any crew member has the authority to decline the task if they are not willing to either accept or continue the task.

1.6 Safety & Risk Assessments

1.6.1 Task Risk Assessment

The ARC has primary authority for aircraft mission and task assignment. The Pilot in Command (PIC) may delay, refuse, or request a mission plan be adjusted if, in their opinion, any of the set conditions are not safe or are beyond the capability of the SRU.

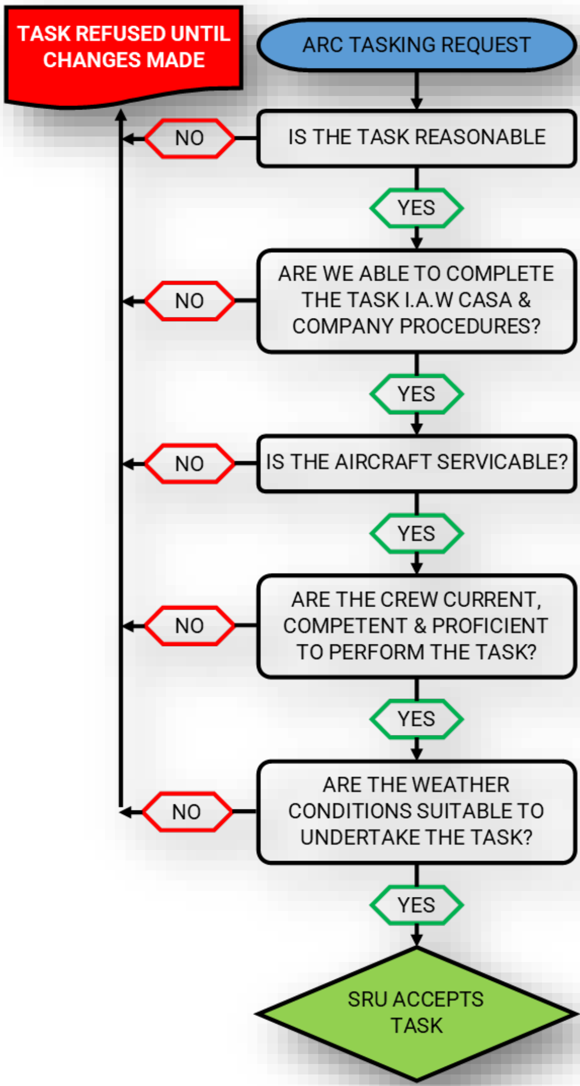
The PIC has overall responsibility for the safety of the aircraft and its crew.

The sole authority and responsibility for determining priorities for the use of the online aircraft rests with the ARC, in accordance with the priorities and processes defined in the following paragraphs.

Prior to accepting SAR mission tasking, the crew will conduct a risk assessment in conformity with their company's standard risk management practices and operating procedures.

Risk must be constantly updated by the crew during any task.

The flow chart (Task Risk Assessment) shown to the right is a simplified process to assess risk for an assigned task.



IMPORTANT

Under no circumstances will the ARC knowingly request or coerce a flight outside the SRU's operational guidelines or approvals.

1.6.2 Dynamic Risk Assessment

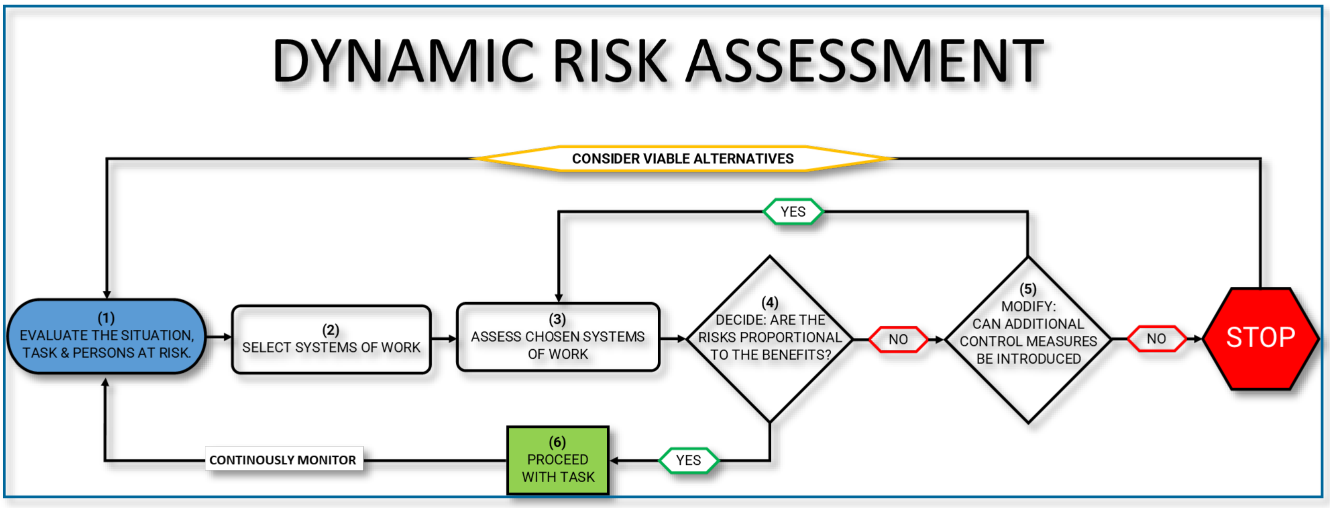
A Dynamic Risk Assessment (DRA) is the continuous process of identifying, assessing, and controlling risks in the rapidly changing circumstances of an operational incident or training scenario.

This section outlines the requirement for, and the process of, a DRA as a fundamental component in ensuring the safety of emergency responders and others during response activities and training.

During all emergency response or training activities, this may occur in conjunction with a formal risk assessment or when no formal risk assessment has been undertaken.

A DRA should only be used as the sole process for risk management in contexts where the incident or training scenario presents dynamic risks. Where an incident or training scenario allows for proper and documented planning, this must occur in addition to a DRA being utilized by emergency personnel as a continuous and supplementary outcome.

The DRA process involves the following six steps to identify, assess, and control risks.



1. Evaluate the Situation, Tasks and Persons at Risk

1.1 Consider what information and tools are available (e.g. ARC Briefing information, SMEACS-Q briefing, environmental conditions).

1.2 Identify the hazards and risks in carrying out the objectives/tasks, and determine what risks are associated with these hazards that could affect emergency service personnel, the public, and/or the environment.

1.3 Evaluate the risk by considering the likelihood and consequences of an adverse event.

1.4 Determine what resources are available (e.g. personnel, appliances, equipment, or specialist advice), as well as the capabilities and limitations of these resources under the operational environment.

1.5 Communicate with crew members, supervisors, the Search and Rescue Mission Coordinator (SMC), Incident Controller, Safety Officer, or specialist personnel, as appropriate.

2. Select Systems of Work

2.1 Consider the possible systems of work and choose the most appropriate for the situation. Begin with established procedures that have been considered in pre-planning and training.

2.2 Ensure that personnel are competent (this may include skills, qualifications, training, or experience, or a combination of all three) before performing future tasks.

3. Assess the Chosen Systems of Work

3.1 Assess the chosen systems of work and determine the acceptable risk. What is deemed an acceptable risk will depend on a range of factors including (but not limited to):

- Agency procedures and training
- The potential risk to emergency responders and the community (i.e., does the system of work maintain responder safety?)
- Information on whether there are lives at risk that can be saved
- The real value of the asset involved (building, equipment, and the environment)
- The likely cost (financial/social/community) arising from the incident or the potential escalation of the incident
- The likelihood and consequence of an adverse event occurring
- The time required for the response and any anticipated changes that may lead to a deterioration of the situation

3.2 Consult with crews that are affected by the identified risk on matters that will affect their health and safety, and the suitability and availability of the controls to eliminate or minimise risk.

4. Decide: Are the risks proportional to the benefits?

4.1 Remember, responder safety is paramount.

4.2 Determine whether the risks of the tasks are proportional to the benefits based on the suitability and availability of controls. Assess whether the benefit gained from carrying out the tasks outweighs the possible consequences if the risks are realised.

4.3 If the answer is YES (benefits outweigh the risks), go to Step 6 (Proceed with task).

4.4 If the answer is NO (risks outweigh the benefits), go to Step 5 (Modify).

5. Modify: Can additional control measures be introduced?

5.1 When deciding if additional measures can be introduced, consider the following hierarchy of risk controls. One or more of these controls can be used to address a hazard:

Elimination – e.g., remove hazards if possible.

Substitution – e.g., use additional specialist resources, such as TIER 1 Assets or other ESOs.

Engineering Controls – e.g., specialist equipment/tools.

Administrative Controls – e.g., appoint a Safety Officer or consult ARC.

Personal Protective Equipment (PPE) – e.g., use additional PPE such as safety glasses, harnesses, hearing protection, P2 masks.

5.2 If the answer is YES, introduce the identified risk controls and return to Step 3 (Assess).

5.3 If the answer is NO, DO NOT PROCEED WITH THE TASK and return to Step 1 (Evaluate).

6. Proceed with task

6.1 Proceed with the tasking after communicating with all personnel on agreed safety measures and procedures:

- Both individual and team goals are understood.
- Responsibilities have been clearly allocated.
- Safety measures and procedures are clearly understood.
- Consider appointing a Safety Officer.

6.2 Continuously monitor the risks and return to Step 1 if there is a change to the situation.

1.6.3 Safety

SRU and responder safety is paramount. SRU personnel must ensure that the protection and preservation of life is maintained at all times while also maintaining the safety of themselves and their crew.

The operational and dynamic risk assessment process of the SRU must be conducted before any flight proceeds. Three primary criteria must be met:

- Is it safe to conduct the intended flight?
- Is it an SOP within the organisation's or operator's Standard Operating Procedures?
- Is it legal to conduct the planned flight?

1.7 ARC Briefings, Mission Reports and De-Briefs

1.7.1 Tasking

If the initial point of contact for any ARC tasking changes from the established processes, the SRU should inform the ARC routinely via the DSR or by voice, depending on the situation. In cases where advance planning is beneficial, initial contact with an SRU may involve providing advance warning of a potential task, taking into account the time of day and task priority. The duty SRU contact will then take appropriate action and follow up with a request to the relevant tasking authority.

For immediate SAR responses, both the SRU and ARC should jointly:

Validate the commencement point/area of the proposed operation (e.g., by Latitude and Longitude and/or bearing and distance from a known point).

Agree on and log the time of task acceptance.

The SRU should confirm the task and time of acceptance using clear and precise language, such as:

“Callsign xxx (RESCUE 123) accepts this task at time hh mm (UTC) to zzzz (location).”

Note:
The acceptance statement is required so there is no confusion on acceptance for ARC planning purposes.

The ARC will provide the aircraft crew with as much information as possible, which may include:

- SAR incident number & task ID (when available)
- Type of task or combinations of tasks (mandatory)
- Nature of SAR target (mandatory)
- Nominal location of SAR target (including Lat/Long when available) (mandatory)
- Short summary of incident details to date (when available)
- Related intelligence (when available)
- Specific requirements (e.g., additional observers, equipment, overnight etc.) (mandatory)
- Other tasked assets/SRUs (when available)

Upon receiving a written brief from the ARC, the aircraft crew will:

- Confirm receipt and understanding of the tasking/briefing by contacting the ARC
- Submit a flight plan commensurate with the SAR task
- Advise of a suitable alternate aerodrome if known
- Advise the latest divert time to the destination if known
- Submit a crew manifest to the ARC when a crew change occurs, or additional crew is carried
- Jointly agree on the SAR mission start time/ETD with the ARC

If the SAR mission tasking/briefing is conducted by telephone, the ARC may follow up with a written briefing sent to the appropriate SRU duty contact. For more complex, extensive missions or those requiring specific capability or capacity, the ARC may transmit a detailed SAR mission briefing to the SRU's nominated point of contact. The briefing may include:

- Full description and nature of the distress
- Search area weather forecast
- Search area and description of any intelligence indicating the presence of the target
- ARC requirements concerning the flight to and from the search area, including route and levels
- Search task, including patterns to be flown and methods to record areas not searched
- Other aircraft and surface assets in or near the area
- Communication procedures and frequencies to be used in the search area
- Frequencies to be monitored for transmissions from survivors
- Action to be taken on sighting the target
- Location and means of debriefing, including details of information required
- Restricted airspace or airspace arrangements
- Fuelling arrangements required by the aircraft, or made by the ARC

If the SAR mission requires additional logistics support, such as extra crew or extended stay away from the home base, the ARC will inform the SRU of the overall mission profile to enable appropriate arrangements.

1.7.2 Geographic referencing

If position information is communicated in latitude and longitude format for SAR operations, it is recommended to use the degrees and decimal minutes (DD MM.mm) format.

Geographic referencing involves locating a point on the Earth's surface, either physically or on a chart or map, using a system of coordinates. While aviators and mariners typically use latitude and longitude to define their position, these coordinates can be displayed in different formats, such as a grid system. Latitude and longitude are angular measurements in degrees (°), minutes (‘), and seconds (“).

These coordinates can be presented in various formats, including:

- Degrees and decimal minutes (DD MM.mm’)
- Degrees, minutes, and seconds (DD MM’ SS”)
- Decimal degrees (DD. DDDD)

1.7.3 Prior to Departure

When instructed by the ARC during tasking or briefing, the SAR crew must contact the ARC to receive any last-minute updates or changes to the SAR mission

1.7.4 Approaching the Mission Area

While a definition exists for a search area, there is no standard definition for a mission area. For these procedures, the mission area is defined as the region that may contain the target and could also include vehicles, vessels, and other surface craft that might be able to offer assistance.

When approaching the SAR mission area, the aircraft crew should:

- Monitor for emergency beacon signals if applicable,
- Monitor distress frequencies if applicable,
- Broadcast (all stations broadcast) on the search area frequency and the on-scene frequency at the entry point, minus 10 minutes (if departing from a point more than 10 minutes flying time away),
- Attempt to establish communication and locate:
  - The SAR target on all relevant frequencies, and
  - Aircraft, vehicles, vessels, and other surface craft that may be, or may have been, in the mission area and could provide intelligence or assistance,
- Update the ARC with:
  - Any change in ETA from the original, and
  - Any significant sightings or intelligence gathered,
- Track to the designated entry point, ensuring it remains vertically or horizontally clear of other designated search areas (which may or may not have aircraft operating in them),
- Plan the entry track and altitude to avoid crossing or entering adjacent occupied search areas (if unavoidable, the pilot must broadcast intentions on both the area and on-scene frequencies, e.g., "All stations C/S XXX, position, altitude, crossing search area A1 on track to area B1"), and
- Refrain from deviating from the mission briefing without prior contact with the ARC.

1.7.5 On Task

Contact the ARC

When it is safe to do so, the crew should contact the ARC for the following:

- Beacon Homing:
  - When approaching the mission area or when a beacon is first detected (either audibly or on the homer).
- All Other Types of Searches:
  - Upon commencement of the briefed task.

During the Task

During the mission, the crew must:

- Maintain a listening watch on the search area frequency,

Report to the ARC

The aircraft crew must immediately provide a verbal or electronic report, as appropriate, when any of the following occurs:

- The target is sighted, or communication is established with the target,
- Debris is sighted,
- Any action is being taken – sighted and under investigation,
- Anything deemed significant by the crew,
- Actual weather and surface conditions change or indicate a potential change in conditions,
- Emergency supplies are deployed.
- Latest divert time and update it if significantly changed,
- Forecast weather necessitates a change in destination or holding/alternate requirements.

NOTE:

Where practicable, the aircraft should not drop any equipment without consulting the ARC.

Nevertheless, if the situation necessitates (e.g., safety of life, poor visibility or weather conditions, and target marking is imperative), equipment may be dropped prior to consulting with the ARC. When equipment is dropped, the crew must complete a SARweb Debrief as soon as possible after returning to base, which should also include the serial numbers of all dispatched equipment.

1.7.6 After Landing

A flight or technical crewmember is to complete a SARweb Debrief Report to the ARC no later than one hour after landing. If the Debrief Report contains operational data or information significant to the SAR Mission that was not provided to the ARC in earlier reports, then the SAR crew must contact the ARC and provide this additional information. If a quick turnaround is involved, the aircraft crew will telephone and consult with the ARC to check what is required at that time. Reports will be primarily submitted to the ARC by electronic means, but where a report is of an exceptional nature, voice reporting may be appropriate. In cases where internet access is not available, reports may be forwarded via SAR Debrief Form (example at Appendix 1A to this Section and included with each Task Brief) by fax or voice.

In completing the reports in an appropriate and timely manner, during the conduct of a mission, aircraft crew should be aware of and note:

- Weather and surface conditions
- Search conditions and challenges
- Significant sightings, observations, or hearings should include anything that the aircraft crew considers pertinent, and may include:
  - Burnt vegetation/fire/smoke
  - Detection of distress beacon or hearing emergency calls on radio
  - Flares/ground signs
  - Wreckage/flotsam/debris/oil slicks/sharks
  - An area of discoloured water
  - A vessel discharging waste or discoloured water

  - Navigation hazards
  - Any distress situation or potential distress situation
- Aircraft (historical track)
- Communications contacts of SAR significance
- Latest time to divert
- Extent of task completed
- Component of mission remaining with estimate of time to complete and risk of non-completion with reasons
- Suggestions for further action
- Location of any vessels/aircraft in the immediate vicinity of the search area
- Significant predatory marine life in the area – sharks, crocodiles, etc.
- If over land, any access roads or landing sites for fixed or rotary wing
- Any imagery, media, or other related items should be uploaded to the SARweb debrief

IMPORTANT:

The SAR Debrief report is an important component of any tasking. SRUs should aim to include as much information and commentary on the task as possible.

1.8 Forward Field Base

1.8.1 Forward Field Base Operations

As an incident escalates in size and/or complexity, the SAR Mission Coordinator may delegate some or all management functions of incident control—such as planning, intelligence, public information, operations, investigation, logistics, and finance—to a team deployed closer to the SAR incident site. AMSA may establish a Forward Field Base (FFB) at a suitable location, with its feasibility determined by the SAR Authority.

FFBs can be relatively primitive airfields or suitable locations used for refuelling and re-tasking SRUs as part of forward operations near the area of operations. The degree of delegation attributed to the FFB, and its actual responsibilities will be at the SMC's discretion, considering the need for:

- A clear understanding of respective responsibilities; and
- An optimum response to the operational and administrative features of the current situation, such as the location of the search area and the availability of staff.
- After evaluating how best to control SAR assets in remote sectors of an SRR, or where communications, administrative, or political factors impact operational efficiency, the SMC may recommend establishing an FFB close to the incident.
- The functions of an FFB during a particular SAR action shall be delegated by the SMC and may include:
- Briefing and debriefing search crews operating aircraft from an aerodrome close to the search area.
- Establishing a base for helicopter operations, not necessarily at an aerodrome.
- Coordinating the provision of safety, survival, and SAR equipment to participating SAR aircraft and helicopters.
- Collating intelligence information and providing logistical support.
- Liaising with AMSA - Response, police, and emergency services.
- Supervising the allocation of observers and ensuring they obtain adequate rest; and
- Making arrangements for food, accommodation, and transport for search crews and observers when required.

1.8.2 FFB Management

Under the AIIMS Aviation Roles, AMSA will manage FFB operations and deploy staff to assume the Airbase Manager role. The FFB Manager is responsible to the SMC for managing the FFB. In considering the establishment of a FFB, the SMC shall evaluate communications requirements and existing facilities, including terrestrial networks, satellite communication links, mobile phones, facsimile machines, and facilities available through other agencies, such as Police, ADF assets, and State/Territory Emergency Services (SES/TES).

When selecting a location for a FFB, the SMC will consider:

- Navigation aids available.
- Geographical limitations.
- Aerodrome or landing area suitability and proximity to the search area.
- Apron capacity.
- Refuelling capabilities at the airfield.

- Maintenance and logistical support.
- SAR crew briefing facilities; and
- Availability of accommodation in the vicinity.

NOTE:

While it is common for AMSA to establish an FFB for large searches, it is not normal practice to transfer any command functions from the ARC.

AMSA's Asset Management & Preparedness Team will oversee the establishment and coordination of any AMSA-initiated FFB. Typically, the regional Senior Officer Standards will be the first AMSA presence, supported by the larger Aviation Asset Management team.

1.9 Carriage of AMSA Personnel

The carriage of AMSA or other ESO staff on company aircraft may be required for AMSA-sponsored taskings, auditing, and training flights. AMSA staff may bring operational and/or life support equipment necessary for their assigned functions.

1.10 Exemptions and Approvals for the Conduct of SAR Operations

AMSA will not grant approvals or exemptions from Aviation Law, SRU Procedures Manuals, or AMSA SRU Procedures Manuals regarding the conduct of SAR operations.

The ARC will not request or coerce a mercy flight for SAR operations if a risk assessment deems task refusal appropriate under the circumstances.

1.11 Usage and Re-supply of AMSA Equipment and Materials

1.11.1 Live SAR

The resupply procedure for all AMSA-provided droppable equipment used in live SAR operations is as follows:

- Provide a debrief report via SARweb no later than one hour after the completion of the mission. If this is not possible, report verbally with ARC agreement and submit a follow-up report within 24 hours detailing the type, serial number, and frequency of any SAR equipment requiring replacement by AMSA.
- AMSA Asset Management & Preparedness will coordinate with the maintenance contractor to resupply the SRU.

1.11.2 Non-AMSA Tasks

The resupply procedure for all AMSA-provided droppable SAR equipment and consumables used for non-AMSA tasks is as follows:

- Within 24 hours, email the ARC (rccaus@amsa.gov.au) and your dedicated AMSA Asset Management & Preparedness (AM&P) Regional Senior Standards Officer with the following details:
  - Equipment/item dropped (including serial number/s),
  - Date of incident,
  - Location of incident,
  - Reason for equipment usage,
  - Tasking authority (e.g., Police, Ambulance),
  - Tasking authority's Task Number.
- The ARC will generate a task within the AMSA Incident Management System upon receipt of this information. This will create a SARweb debrief that needs to be completed by the SRU, including the 'drop report'. This process will activate the supply chain for equipment resupply.

IMPORTANT:

If time permits, SRUs should contact the ARC prior to any Non-AMSA task where use of AMSA equipment is expected. This will allow the creation of an incident and provide awareness to the ARC.

1.12 Stewardship of AMSA Supplied Equipment and Materials

AMSA must, at its cost, provide and maintain AMSA-provided SAR equipment for use by the SRU.

The SRU must:

- Store the AMSA-Provided SAR Equipment, when it is not in use, in a suitable building (with appropriate security) within close proximity to the Aircraft and in accordance with any storage instructions notified by AMSA or marked on the AMSA-Provided SAR Equipment.
- Use the AMSA-Provided SAR Equipment for the purposes only of the SAR Services or other orders, procedures or directions notified by AMSA from time to time.
- On request from AMSA or its nominee, arrange to dispatch or receive within 24 hours of the request (at AMSA's cost) specified items of the AMSA-Provided SAR Equipment for testing, maintenance or replacement to or from the address specified by AMSA or its nominee.
- Maintain a record of the items of AMSA-Provided SAR Equipment held by the SRU and the items of AMSA-Provided SAR Equipment consumed by the SRU and the reason for which the AMSA-Provided SAR Equipment was consumed.
- Notify the ARC of the items of AMSA-Provided SAR Equipment consumed by the SRU, in writing as soon as possible and in any event within 24 hours of the item being consumed.
- Provide Crew ongoing training in use of AMSA-Provided SAR Equipment.

AMSA-provided SAR equipment remains AMSA's property. The SRU is not required to maintain insurance for theft, accidental breakage, loss, or replacement. However, damage to returned equipment caused by negligence (excluding fair wear and tear) may result in cost recovery by AMSA.

1.13 Interaction with the Media

The SRU must not, and must ensure that the SRU's Personnel do not, at any time, make any disclosure or publish any statement (by means of advertisement or otherwise) about or in relation to the SAR Services, unless the SRU has obtained AMSA's consent to the disclosure or publication, which consent:

- May not be unreasonably withheld by AMSA.
- May be given subject to reasonable conditions; and
- May be withdrawn by AMSA at any time.

The SRU must not make any disclosure or statement about or in relation to the SAR Services that would:

- Constitute a disclosure of "personal information" or "sensitive information" within the meaning given in section 6 of the *Privacy Act 1988*; and
- Be likely to cause harm, damage or loss to the reputation or business of AMSA either directly or indirectly.

APPENDICES VOLUME 1

Appendix A – Tasking Brief (Example)

Australian Government
Australian Maritime Safety Authority

AMSA SEARCH AND RESCUE
JRCC AUSTRALIA

TASK BRIEFING

Aviation	1800 815 257 / +612 6230 6899
Maritime	1800 641 792 / +612 6230 6811
FAX	1800 622 153
AFTN	YSARYCYX

Callsign/Type:	RSCU421 / B412	**Version:**	**1**
Incident Number:	2023/5951	Task Id:	78717
From:	RCC Australia	Date (UTC):	230637 UTC AUG 2023

Each pilot must complete the following instructions.

Preparation Checklist

- Clean aircraft windows
- Check pilot and observer communications
- Pack anti-motion tablets/sick bags
- Brief observers
- Carry observer bags where applicable
- Organise light refreshments
- Carry life jackets/raft if required

SAR Operations

- **Comply with CARs/CAO requirements**
- En-route practice scanning at search track spacing and search height
- Maintain a log of search actions and sightings
- Consider operating with lights on

Sighting Action

- Maintain visual contact
- Mark location if possible
- Make positive ID
- Advise latest divert time
- Determine position
- Pass position to JRCC
- Assess rescue access/vessels in area
- Advise number and condition of survivors

Note

Where possible, obtain JRCC approval prior to dropping supplies.

Any GPX track provided is indicative only. Conduct the task according to the brief.

Before departure:

1. Pilot and crew must read this Briefing with relevant charts.
2. Contact JRCC on 1800 815 257 / +612 6230 6899 to:
   - Confirm receipt and understanding of this Briefing.
   - Advise (now and during search) if assigned task, or aircraft systems failure reduces the ability of the aircraft or pilot to complete the task.
3. Pilot responsible for obtaining NOTAMS and weather.
4. Submit a flight plan with SAR Priority, POB and endurance.
5. Complete and return a Manifest to the JRCC.

After departure:

1. Provide Departure Report to Air Traffic Services with ETA in search area.
2. Where possible, maintain full reporting and a continuous listening watch on Air Traffic Services frequencies.

On arrival in your search area:

1. If communications relay aircraft airborne, contact and arrange reporting schedules.
2. Use available communications to provide the JRCC with Arrival Report and actual weather and suitability of conditions for the search allocation.
3. Monitor 121.5/243 MHz for distress signals.
4. Advise JRCC of any sightings.
5. Thirty minutes prior to departing the search area advise JRCC with remaining endurance or search legs not searched and reasons.

On departure from your search area:

1. Provide the JRCC with Departure Report (include areas not searched and reasons) and ETA at your destination.

After Landing:

1. Consult with observers to complete attached Debrief. The DEBRIEF is a MISSION CRITICAL DOCUMENT, please give it a high priority at the completion of this task. Fax Debrief to JRCC on 1800 622 153.
2. Contact the JRCC on 1800 815 257 / +612 6230 6899 to confirm receipt of Debrief Form.

DO NOT deviate from this Briefing WITHOUT prior contact with the JRCC.

Incident Number: 2023/5951 Task Identifier: 78717 **Callsign/Type: RSCU421 / B412**
Task Briefing

Callsign/Type: RSCU421 / B412		Incident Number: 2023/5951
Version: 1	Task Identifier: 78717	Created At: 230637 UTC AUG 2023

Situation

Situation As Exists

SAREX SAREX SAREX

Unregistered 406.040MHz beacon detected in position 16 57.22'S 146 08.22'E at the North-western end of Sudbury Reef. Water Police Advise beacon is associated with an upturned 5m aluminium dinghy, 2 x Pax have been rescued by Water Police near Sudbury Cay, 2 x Pax still not accounted for.

Person 1 Wearing Orange Fishing Shirt
Person 2 Wearing Blue Fishing Shirt and Lifejacket.

Search Overview

RSCU421 is tasked to conduct a visual search for th emissing persons.

Adjacent Assets

PV Perry Irwin

Look For:	Debris, Distress Beacon, Fire, Flares, Ground Scars, Ground Signs, Life Jackets, Liferaft/Dinghy, Mirror Signals, Movements, Oil Slick, Person in Water, Smoke, Wreckage		
Search Area Last Light:	240829 UTC AUG 2023		
Communication Relay Aircraft Callsign/Type:	/	Frequency:	
Comms Plan:			

Task Details

Departure Location:	CAIRNS YBCS	Required ETD:	240000 UTC Aug 2023
Destination Location:	CAIRNS YBCS	Crew / Observers:	2 /
Total Track Miles:	86.3 NM		
Notes:	SAREX SAREX SAREX 1. Track to and conduct a visual search of area A1 for person in the water. 2. Pass any relevant information to JRCC Australia or PV Perry Irwin (CH16). 3. Be prepared for winch rescue.		

1.Parallel Track

Area Designator:	A1				
First Track:	163 M	Search Height:	500 ft	Track Spacing:	0.25 NM
Distance:	004 NM	Search TAS:	60 kt	Number of Legs:	9
Entry Point:	16 54.52` S, 146 09.55` E		End of Leg One:	16 58.73` S, 146 10.27` E	
Exit Point:	16 58.87` S, 146 08.18` E				
Total Track Miles	40.4 NM			Search Track Miles:	38.4 NM

Callsign/Type: RSCU421 / B412
Version: 1

Task Identifier: 78717

Incident Number: 2023/5951
Created At: 230637 UTC AUG 2023

Waypoints

1.Parallel Track

Wpt	Coordinates
1	16 54.52` S, 146 09.55` E
2	16 58.73` S, 146 10.27` E
3	16 58.75` S, 146 10.01` E
4	16 54.53` S, 146 09.29` E
5	16 54.55` S, 146 09.03` E
6	16 58.76` S, 146 09.75` E
7	16 58.78` S, 146 09.49` E
8	16 54.56` S, 146 08.77` E
9	16 54.57` S, 146 08.50` E
10	16 58.80` S, 146 09.23` E
11	16 58.81` S, 146 08.97` E
12	16 54.59` S, 146 08.24` E
13	16 54.60` S, 146 07.98` E
14	16 58.83` S, 146 08.70` E
15	16 58.85` S, 146 08.44` E
16	16 54.62` S, 146 07.72` E
17	16 54.63` S, 146 07.46` E
18	16 58.87` S, 146 08.18` E

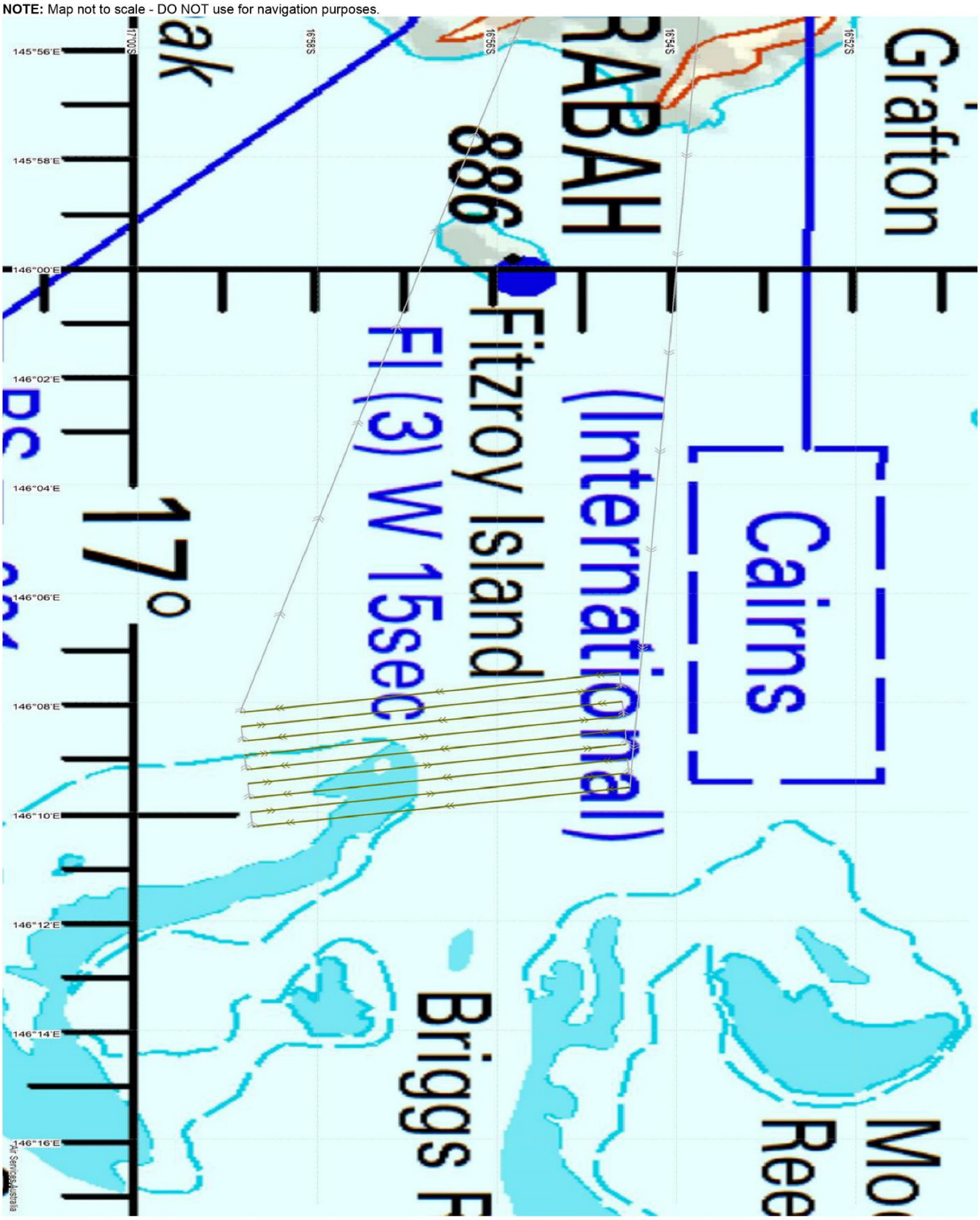
Leg	Segment	Track (M)	Dist (NM)
1	1 - 2	163	4.25
	2 - 3	259	0.25
2	3 - 4	343	4.25
	4 - 5	259	0.25
3	5 - 6	163	4.3
	6 - 7	259	0.25
4	7 - 8	343	4.3
	8 - 9	259	0.25
5	9 - 10	163	4.3
	10 - 11	259	0.25
6	11 - 12	343	4.3
	12 - 13	259	0.25
7	13 - 14	163	4.3
	14 - 15	259	0.25
8	15 - 16	343	4.3
	16 - 17	259	0.25
9	17 - 18	163	4.3

Callsign/Type: RSCU421 / B412
Version: 1

Task Identifier: 78717

Incident Number: 2023/5951
Created At: 230637 UTC AUG 2023

NOTE: Map not to scale - DO NOT use for navigation purposes.



Callsign/Type: RSCU421 / B412
Version: 1

Task Identifier: 78717

Incident Number: 2023/5951
Created At: 230637 UTC AUG 2023

SAR FLIGHT DEBRIEF FORM

Instructions	1. Complete and return this Debrief form to the JRCC as soon as possible after landing. JRCC FAX 1800 622 153 2. Contact the JRCC to confirm receipt of the Debrief Form. JRCC PHONE 1800 815 257 / +612 6230 6899.

Aircraft Details

Callsign/Type:	RSCU421 / B412		
Company:		Incident Number:	2023/5951
Fax/Email:		Date (UTC):	230637 UTC AUG 2023

Task Details (comment on search issues, difficulties and how well or poorly the search was conducted.)

Task Completion (Strike out legs completed and include reasons for not completing any legs)

1.Parallel Track 1.2.3.4.5.6.7.8.9.

Task Area Weather

Wind:		Sea Conditions:	
Cloud:		Swell:	
Visibility:			
Remarks:			

Sightings

Objects (Vessels, flotsam, shark, oil slicks etc.)	Position (Lat/Long)	Time UTC
1.		
2.		
3.		
4.		
5.		

Equipment Dropped, Location and Time (include frequencies and serial numbers where applicable)

Remarks about equipment performance:

Callsign/Type: RSCU421 / B412
Version: 1

Task Identifier: 78717

Incident Number: 2023/5951
Created At: 230637 UTC AUG 2023

Administration

(all times use six figure UTC)

	ENGS On	DEP AD and Time	On Search	Off Search	ARR AD and Time	ENGS Off
1.						
2.						
3.						
4.						

Total Time:................................Hours.......................Mins.......................

Incidentals (Estimated costs $)

Accommodation:	
Transport:	
Food and drink:	
Fuel:	
Landing fees:	
Hire of Officer:	
Other:	
Estimated total costs $:	

This is an operational debrief form, only estimated costs are required. On completion a search letter will be sent to your allocated finance department inviting invoicing for services provided.

System

(Internal Use Only : strikeout when complete)

Operationally Processed

Administratively Processed

Callsign/Type: RSCU421 / B412
Version: 1

Task Identifier: 78717

Incident Number: 2023/5951
Created At: 230637 UTC AUG 2023

SAR AIRCRAFT CREW AND PASSENGER MANIFEST

Instructions

Prior to departure, fax either a completed Company Manifest or this Manifest to the JRCC. You must include the names, addresses and phone numbers of all personnel onboard the aircraft.
JRCC FAX 1800 622 153

If you are unable to fax these details contact the JRCC on:
JRCC Phone 1800 815 257 / +612 6230 6899

Aircraft/Incident Details

Callsign/Type:	RSCU421 / B412	Incident Number:	2023/5951

Crew and Passenger Manifest

Name:	Address:	Phone Number:

SAR Communication

2. SAR COMMUNICATION

2.1 General SAR Communications Procedures

The objective of search and rescue communications is to ensure the safe and efficient conduct of SAR operations. Communications must enable:

- Rapid transmission of distress messages from aircraft, ships, and small craft, including medical assistance requests.
- Swift communication of distress information to the authorities responsible for organizing and executing the rescue.
- Effective coordination of various SAR units involved in the operation.
- Ongoing liaison between controlling or coordinating authorities and SAR units.

2.1.1 SAR Frequencies

The following frequencies have been authorised for use in SAR operations:

- 2182, 3023, 4125, 5680 kHz.
  - These frequencies may be used for communications between mobile stations when employed in coordinated search and rescue operations, including communications between these stations and participating land stations.
- 123.1 MHz
  - The international SAR on-scene frequency for use in coordinated SAR operations. Ships with this capability are authorised to communicate on this frequency with aircraft for safety purposes.
- 123.2 MHz
  - For supplementary continental use in on-scene coordination within the Australian SRR.
- 282.8 MHz
  - Used by military ships and aircraft for communications during coordinated SAR Operations

NOTE:

The aeronautical mobile service uses amplitude modulation (AM) for VHF telephony while the maritime mobile service uses frequency modulation (FM). These services are incompatible.

2.1.2 SAR Call Signs

Assets regularly involved in SAR and emergency support operations may be assigned individual call signs, principally for use in radio communications. Assigned call signs may also be used in other documentation and systems to identify aircraft.

Call signs are intended to:

- Unambiguously identify emergency operations and rescue assets and aircraft in air traffic systems.
- Indicate to Air Traffic Services (ATS) personnel the nature of an aircraft operation in order that appropriate priority and assistance may be provided.
- Unambiguously identify operational aircraft to emergency agency personnel.
- Assist with situational awareness for personnel involved in management, support and supervision of aerial operations.
- Simplify agency radio communications by using call signs that are compatible with agency radio systems and consistent with non-aviation operations.

Aircraft

The normal practice is for aircraft engaged in SAR operations to continue to use their existing civil or military call sign. In exceptional circumstances, search aircraft may be allocated a 'RESCUE' call sign followed by a three-digit number that is drawn from the following bands:

Asset Category	"Rescue Number" Allocation
Army Aircraft	001 – 100
RAAF Aircraft	101 – 310
Civil Aircraft	311 – 799
RAN Aircraft	800 – 930
Foreign Aircraft	931 – 999

Surface Units

If allocation of call signs for surface units is required, the following may be used:

Asset Category	Callsign Allocation
Marine Craft	SAR Launch (Number)
Land Units	Land Rescue (Number)
ADF Ships	Vessel Name as Callsign

AMSA Dedicated SAR Aircraft

The SAR mission call signs assigned to each of AMSA's dedicated Challenger 604 aircraft:

Aircraft Registration	Callsign
VH-XNE	Rescue 330
VH-XNC	Rescue 440
VH-XNF	Rescue 550
VH-XND	Rescue 660

2.2 Operational Communication with the ARC

2.2.1 Overview

The order of precedence for in-flight communications to the ARC is as follows:

- Voice (via mobile/satellite telephone)
- Voice (via VHF/HF to ATC services).

The AMSA HF DSC network operates two maritime communications stations (Wiluna and Charleville). The network Coordination Centre is staffed 24 hours a day and can coordinate communications between the ARC and SAR units on scene using HF frequencies.

The SMC is responsible for utilising all available communication systems and designating specific frequencies for on-scene use during SAR operations, and for establishing reliable communications with adjacent operations centres. When appointed, the Coordinator Surface Search (CSS) or the On Scene Coordinator (OSC) is responsible for establishing reliable communications between all participating search assets and the ARC.

The SMC is responsible for informing all SAR participants of the specific frequencies selected for an operation. The SMC should designate a primary and secondary frequency in the appropriate frequency bands (HF, VHF and UHF) for use as on-scene channels.

2.3 Aeronautical Communications

A dedicated communications aircraft should be deployed when communications are expected to be poor in the search area and:

- HF is the only available means of communication,
- The search is of large scale,
- There is a need to enhance information feedback to the ARC,
- There is a need to improve information flow to SAR units,
- Search aircraft are operating without contact with a ground station, or
- It is crucial for maintaining communication with survivors, ground search units, and ground rescue units.

Typically, the communications aircraft will be a suitably equipped SAR unit aircraft or a military aircraft, with a minimum crew of a pilot and a radio operator, and capable of good on-scene endurance.

2.4 Maritime Communications

2.4.1 Communications with Merchant Ships

Voice communications between aircraft and merchant ships will initially be conducted on VHF Marine Channel 16 (156.8 MHz). Once communications are positively established and by mutual agreement, a shift to a working frequency may be made, such as VHF Marine Channel 6 (156.3 MHz), which is the designated air/sea SAR channel.

If these frequencies are unavailable, voice communications should be attempted on the following HF frequencies in order: 2182 KHz, 4125 KHz, 6215 KHz, or 8291 KHz.

2.4.2 Communicating with Small Craft

Voice communications between aircraft and small craft will initially be conducted on VHF Marine Channel 16 (156.8 MHz). Once communications are positively established and by mutual agreement, a shift to a working frequency may be made, such as VHF Marine Channel 6 (156.3 MHz), which is the designated air/sea SAR channel.

If VHF communication is unsuccessful, attempt voice communication on 27 MHz, starting with Marine Channel 88 (27.88 MHz) for the initial call, and then shift to Marine Channel 86 (27.86 MHz) once communication is established.

Small craft include police vessels, volunteer marine units, fishing vessels, and recreational vessels.

2.4.3 Global Maritime Distress and Safety System

Ships subject to the Safety of Life at Sea (SOLAS) Convention are obliged to be outfitted with certain communications equipment to participate in the Global Maritime Distress and a Safety System (GMDSS). Fishing vessels and small craft around Australia, if carrying compatible GMDSS equipment can also participate.

AMSA is responsible for the provision of shore facilities for the GMDSS and all distress and safety traffic through the GMDSS shore infrastructure in the Australian SRR will be handled by ARC

Ships operating under GMDSS requirements in the Australian SRR can be expected to carry:

- MF DSC.
- VHF radiotelephone (Channels 6, 13, 16 and 67).
- VHF DSC (Channel 70).
- HF DSC or a ship earth station of a recognised mobile satellite service.
- An AIS-SART or RADAR SART.
- An EPIRB.

2.4.4 Marine Radio Alarm Signal

With the full implementation of the Global Maritime Distress and Safety System (GMDSS) in February 1999, the automatic alarm devices used on 2182 kHz are no longer required. However, some maritime communications stations may still use the voice alarm signal consisting of two sinusoidal audio frequency tones, one of 2200 Hz and the other of 1300 Hz, producing a distinct warbling sound to draw attention to a distress broadcast. Merchant shipping complying with the SOLAS Convention now guard the Digital Selective Calling (DSC) distress frequencies.

2.5 Communication with ADF Units

Ships and aircraft of the Australian Defence Force (ADF) are fitted with communication equipment, which allows for coverage of many of the emergency and SAR frequencies.

2.5.1 Royal Australian Navy (RAN)

Voice communications between aircraft and RAN vessels will initially be conducted on VHF Marine Channel 16 (156.8 MHz). Once communications are positively established and by mutual agreement, a shift to a working frequency may be made, such as VHF Marine Channel 6 (156.3 MHz), which is the designated air/sea SAR channel. Frequency coverage in this band depends on the type of equipment fitted, but all ships can monitor Channel 16 (156.8 MHz).

The RAN is equipping its warships with a full suite of GMDSS communications, including Inmarsat C and VHF/HF DSC, and ADF units are generally fitted with 406 MHz distress beacons.

International Distress Frequencies - Guarded by Royal Australian Naval Ships

A distress watch is maintained as follows by naval ships at sea:

Naval Vessel Type	Communication Type	Watch Details
Major warships (Frigates and above)	HF/VHF DSC, VHF Channel 16	Listening watch will be maintained on Channel 16 until further notice.
Minor warships (Patrol boats and mine hunters)	VHF Channel 16	Continuous loudspeaker watch.

2.5.2 ADF Aviation Assets

ADF aviation aircraft involved in SAR operations will be monitoring the local area frequency and scene of SAR 123.1MHz. Initial contact is to be made on this frequency.

2.6 Communication with Maritime Border Command

The ARC may seek assistance from Maritime Border Command (MBC), which is enabled by the Australian Border Force (ABF) and the Australian Defence Force (ADF). MBC supports whole-of-government efforts to protect Australia's national interests by responding with maritime and air assets for civil maritime security operations, deterring and preventing illegal activities in the Australian Maritime Domain.

The ARC will request assistance in sourcing aircraft through the Australian Maritime Security Operations Centre (AMSOC). For specific search requirements, such as radar or night searches, the ARC will consult with ABF and the contracted provider to determine the best response.

Initial contact with ADF aviation assets is to be made on the local area frequency, followed by a change to a working frequency for all subsequent communications. When available, ABF vessels can also assist with SAR incidents, and the ARC may request their assistance in a manner similar to that for ABF aircraft.

2.6.1 Communications with ABF & ADF Vessels

Voice communications between aircraft and ABF & ADF Vessels will initially be conducted on VHF Marine Channel 16 (156.8 MHz). Once communications are positively established and by mutual agreement, a shift to a working frequency may be made, such as VHF Marine Channel 6 (156.3 MHz), which is the designated air/sea SAR channel.

If initial communication attempts are unsuccessful, further attempts can be made on VHF Marine Channel 69 (156.475 MHz).

2.7 Communication with State/Territory Police Units

State and Territory Police Services typically manage surface assets and ground parties. Communication with maritime and ground units should, whenever possible, be initiated and maintained through the relevant on-scene Police Service via direct VHF, UHF, or telephone (details to be provided by the ARC).

2.8 Communications with Other Ground Parties

For communication with other groups or private citizens, the Citizen Band UHF repeater channel for the area or channels such as Channel 5 (476.525 MHz), 35 (477.275 MHz), 40 (477.400 MHz), or 18 (476.850 MHz) may be used.

Additionally, the emergency frequency VHF 121.5 MHz may be considered, with a transition to VHF 123.1 MHz (or 123.2 MHz) possible once communication is established.

2.9 Communication with Other Agencies

There are many additional communication facilities available for use in SAR operations. It is important that personnel employed in SAR learn what facilities and services are available at their specific location and throughout their area of operations. Some of the more extensive and readily available facilities are:

- The State and Territory authorities have in place a network of nine limited coast radio stations around Australia monitoring 4, 6 and 8 MHz distress frequencies in the HF voice band These authorities also operate VHF sites covering channel 16 and 67.
- Each State/Territory has an extensive volunteer marine radio network. Many of these stations do not operate 24 hours but do operate in the 27 MHz, VHF and MF bands.
- Aeronautical Fixed Telecommunications Network (AFTN) - an international teleprinter network based on ICAO requirements for air navigation services, including SAR. Details of the network can be found in the communications section of the various ICAO Regional Air Navigation Plans. The AFTN in Australia is operated by Airservices Australia.
- Satellite communications offering voice, fax and data.
- Mobile phone and fax communications.
- Electronic (Email, internet, skype and video conferencing).

2.10 Non-Verbal Communication with Survivors

Many signals have been devised over the years to indicate a condition of distress or other emergency status. Personnel involved in SAR operations must be familiar with the types of signals they may encounter to accurately evaluate their meaning and take appropriate action.

The signals listed in this section are the most common and have been accepted by international agreement or national custom or may be significant for occasional use by SAR units. These emergency signals can be conveyed through various means, including radio, radar (e.g., transponders), flags, pyrotechnics, flashing lights, smoke, sounds, shapes, and ground panels.

Given the extensive range of possible emergency signals, this list is not exhaustive.

2.10.1 International Distress Signals

- Persons in distress may use many means at their disposal to attract attention, make known their position and obtain assistance.
- Some basic distress signals are as follows:
- A gun or other explosive signal fired at intervals of about one minute.
- A continuous sounding of any fog-signalling apparatus.
- Rockets or shells, throwing red stars fired one at a time at short intervals.
- A signal made by any signalling method consisting of the group …---… (SOS) in the Morse Code.
- A signal sent by radiotelephony consisting of the spoken word ’Mayday’
- The International Code Signal of distress indicated by the code group NC; (See the International Code of Signals for other code groups with emergency significance.)
- A signal consisting of a square flag having above or below it a ball or anything resembling a ball.
- Flames on a vessel (as from a burning tar barrel, etc.).
- A rocket parachute flare or a hand flare showing a red light.
- A smoke signal giving off a volume of orange-coloured smoke.
- An orange-coloured sheet with a black square and circle or a black “V” or other appropriate symbol.
- Slowly and repeatedly raising and lowering arms outstretched to each side.
- The radiotelephone alarm signal consisting of two tones transmitted alternatively over periods of from 30 seconds to 1 minute.
- Signals transmitted by Emergency Position Indicating Radio Beacons, EPIRB’s or Personal Locator Beacons (PLB’s), Emergency Locator Transmitters (ELT’s).
- Approved signals transmitted by radio communication systems.
- A dye marker.
- Transponder Squawk Codes 7700 Emergency, 7600 Communications failure, 7500 Unlawful interference

2.11 Search and Rescue Signals - Australian SSR

2.11.1 Signals with Surface Craft

When it is necessary for an aircraft to direct a surface craft to the place where an aircraft or surface craft is in distress, the aircraft shall do so by transmitting precise instructions by any means at its disposal. If such precise instructions cannot be transmitted or when necessary for any other reason, the instructions shall be given by using the procedure prescribed herein.

Aircraft Signalling Procedures

The following procedures performed in sequence by an aircraft shall mean that the aircraft is directing a surface craft towards an aircraft or a surface craft in distress:

- Circling the surface craft at least once.
- Crossing the projected course of the surface craft, close ahead at a low altitude, opening and closing the throttle or changing the propeller pitch; and
- Heading in the direction in which the surface craft is to be directed.

Maritime Signalling Procedures

Current maritime signalling procedures include:

- For acknowledging receipt of signals:
  - The hoisting of the Code Pennant (vertical red and white stripes) close up (meaning understood).
  - the flashing of a succession of Ts by signal lamp in Morse code; and
  - the changing of heading.
- For indicating inability to comply:
  - the hoisting of the international flag N (a blue and white checked square); and
  - the flashing of a succession of Ns in Morse code.

Air Search Operations

3. AIR SEARCH OPERATIONS

3.1 General Air Search Procedures

3.1.1 Aim of the Air Search

A search typically involves three stages:

Stage 1. Immediate response. An initial visual and/or electronic search along the missing craft's planned route or suspected distress position.

Stage 2. Nominated area either side of track. Normally a search conducted in an area 10 nautical miles either side of the track, but this can be varied depending on circumstances.

Stage 3. Mathematically derived area. An expanded search of a probability area calculated using the navigational tolerances of the missing and search craft, allowing for drift if applicable and the application of a safety factor.

Stages 1 and 2 searches may be run concurrently. For example, if a distress incident occurs at the end of daylight or during the night, when the first visual search cannot be undertaken until the following day, it may be appropriate to conduct both stages simultaneously.

Any divergences from the agreed search plan, such as variance in altitude or search track due to weather or optimisation of search conditions, must be logged and reported to the ARC. Based on intelligence received, take the appropriate action to locate and assist in the rescue of persons in distress in the shortest possible time.

As part of the search briefing, the aircraft crew will be provided with a detailed search area plan, which will include, amongst other information/data, search height and track spacing. If the aircraft crew believe these parameters need to be varied, they are to advise the ARC accordingly. However, the aircraft shall not deviate from the search plan, except for safety reasons, unless authorised by the ARC.

IMPORTANT:

DO NOT deviate from this Briefing WITHOUT prior contact with the AMSA ARC.

3.1.2 Determination of the Search Area

When the location of a missing vessel or aircraft is not known, a reconstruction of the probable route and an estimation of the most likely position of the incident must be made by the ARC. Two types of areas are calculated to determine the search area. These are based on different information received and calculated regarding the vessel or aircraft, and they are explained below.

Possibility Area

The possibility area is the area in which a missing craft could be located had it continued sailing or until fuel exhaustion in the case of an aircraft. Usually, the area is too large to be considered as the search area, but knowledge of its extent and boundaries may be of use when assessing intelligence information, particularly sighting or hearing reports.

Probability Area

The probability area is that area in which a missing craft or survivors are most likely to be found, accounting for possible errors in the navigation of the missing craft and of search craft, together with an allowance for any water movements should the incident occur over water. This includes a safety factor.

If the distress position of the target is known (by radar, reports from the distressed craft, or from witnesses, etc.), the search area is based on the probability area. If the distress position is not known, the search area is based on the premise that it is:

- Likely between its last reported position and its destination; or
- Most likely to be between the last reported position and the position where the next report should have been made.

3.1.3 Calculating the Track Spacing

Track spacing is calculated using the appropriate sweep width tables (held in the ARC) and applying correction factors. The calculated values are rounded up or down to the nearest half mile.

Factors Affecting Track Spacing

- Type of target
- Meteorological conditions, including cloud, visibility, and shadows
- Type of terrain
- Search altitude

3.1.4 Coverage Factor

Achieving the Desired Coverage Factor

The desired coverage factor for any search is greater than one. It is recognized that this is not always practical or possible; however, a search with a coverage factor of less than 0.5 is generally not considered worthwhile. The SAR Mission Coordinator will consider decreasing the track spacing or reducing the area to be searched to achieve the desired coverage factor.

Coverage factor = sweep width ÷ track spacing. **(C=W/S)**

3.1.5 Search Area Allocation

When developing a search plan, the ARC will carefully weigh the limitations of the following:

- Time.
- Terrain.
- Vegetation.
- Weather.
- Navigation aids.
- Likely search target detectability.
- Numbers, types and suitability of available search units.
- Search area size.
- Distance between search area and staging bases.
- Length of daylight available; and
- The probability of detection desired under the circumstances.

As survival time after an accident is limited, time is of paramount importance, and any delay or misdirected effort will greatly diminish the chances of locating survivors. While thorough mission planning and good conditions for search are desirable, positive and immediate action is also required. Search pattern selection depends on several factors, such as:

- Accuracy of datum.
- Size of the search area.
- Search aircraft available for search.
- Manoeuvrability and navigation accuracy of the search aircraft.
- Horizontal and vertical separation of search aircraft.
- Weather and sea conditions in the search area.
- Size of search target; and
- Type of detection aids survivors may have.

3.1.6 Pre-Search Preparation

Prepare Charts

- Draw search area (this will be supplied by the ARC); and
- Draw legs (these will be supplied by the ARC).

Prepare SAR Log

- Showing legs flown/to be flown.
- Fuel available.
- Enough room to note leg start/finish times, headings, etc.
- Communications; and
- Engine time log.

Failures - Think about:

- Asymmetric operations.
- R/T failures; and
- Navigation aid failures.

Maps and Charts

The most commonly used maps are 1:1,000,000, 1:250,000 or 1:100,000. Familiarise yourself with the scale before an operation requires you to use them. Look for dangerous areas and prominent features, draw legs of your search area and study the features at turning points.

Weight and Balance

Determine the maximum fuel available for searching by having a weight and balance completed for your aircraft with SAR gear and additional observers (if required). This should be done, preferably, before you are tasked by the ARC.

3.2 Air Search Patterns and Techniques

3.2.1 Factors in Search Pattern Selection

Many factors influence the selection of a particular search pattern, such as:

- Known accuracy of distress position.
- Size and shape of search area.
- Number and type of search units to be used.
- Weather conditions.
- Navigation aids.
- Type of target.
- Terrain and time limitations.

3.2.2 Types of Search Patterns

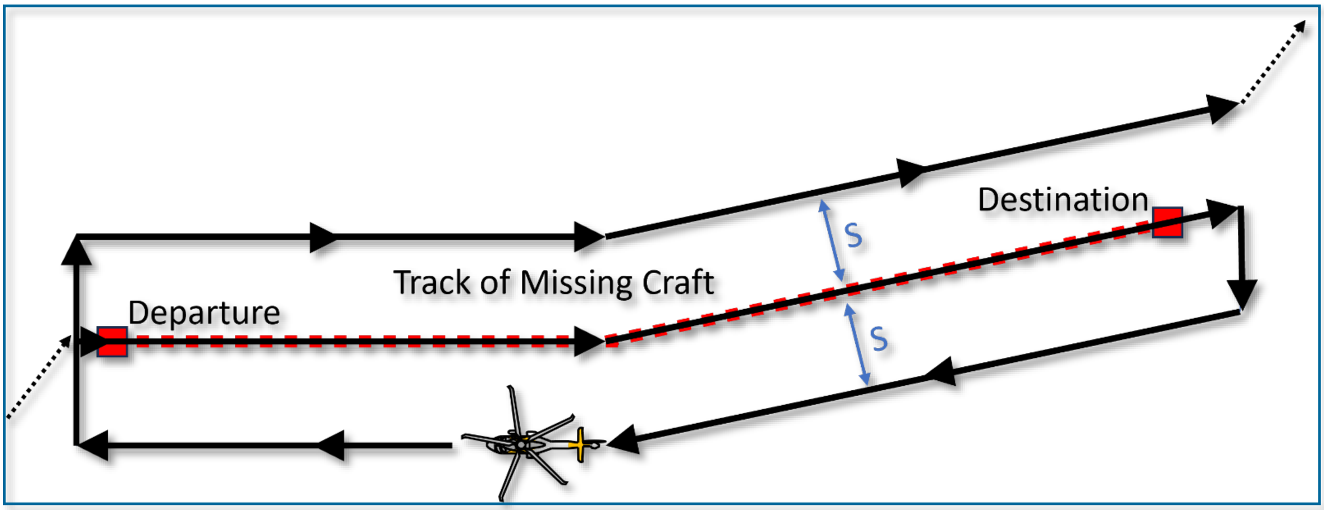
Considering the above factors, one or more of the following search patterns can be selected:

- Trackline.
- Parallel.
- Sector.
- Expanding Square.
- Contour.
- Coastal / Island

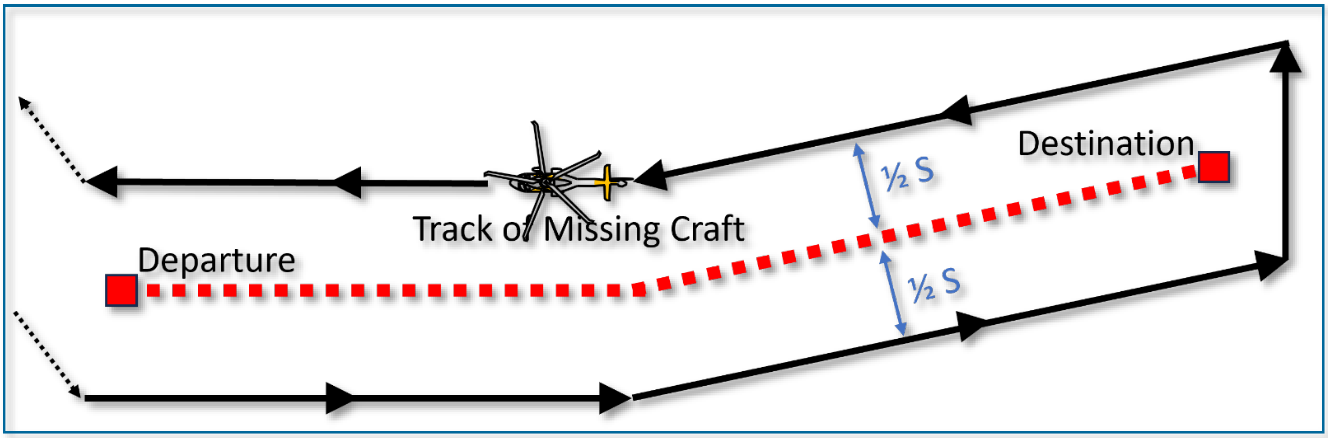
Trackline Search

This procedure is normally employed when an aircraft or vessel has disappeared without a trace. It is based on the assumption that the target has crashed, made a forced landing or ditched on or near the intended route and will be easily seen, or that there are survivors capable of signalling their position by a flashing lamp or other means. It consists of a rapid and reasonably thorough search on either side of the intended route of the target, normally at a height of 1000 to 2000 FT during day or at 2000 to 3000 FT at night. A track line pattern is often used as an initial reaction to a distress situation, the second, intensive phase being introduced on the failure of the track line search.

Aircraft and ships following the same route as that of the missing aircraft or ship should be asked if they are available to divert to assist in the search for the target. For ships, this will mean diverting to intercept the most probable track line of the target. For aircraft, this type of search should be regarded as additional to searches by SAR units, as an enroute aircraft may not be entirely suitable as a search platform due to its performance, configuration, endurance, navigational capabilities or lack of observers



Track Line Search – Aircraft is not returning back along track



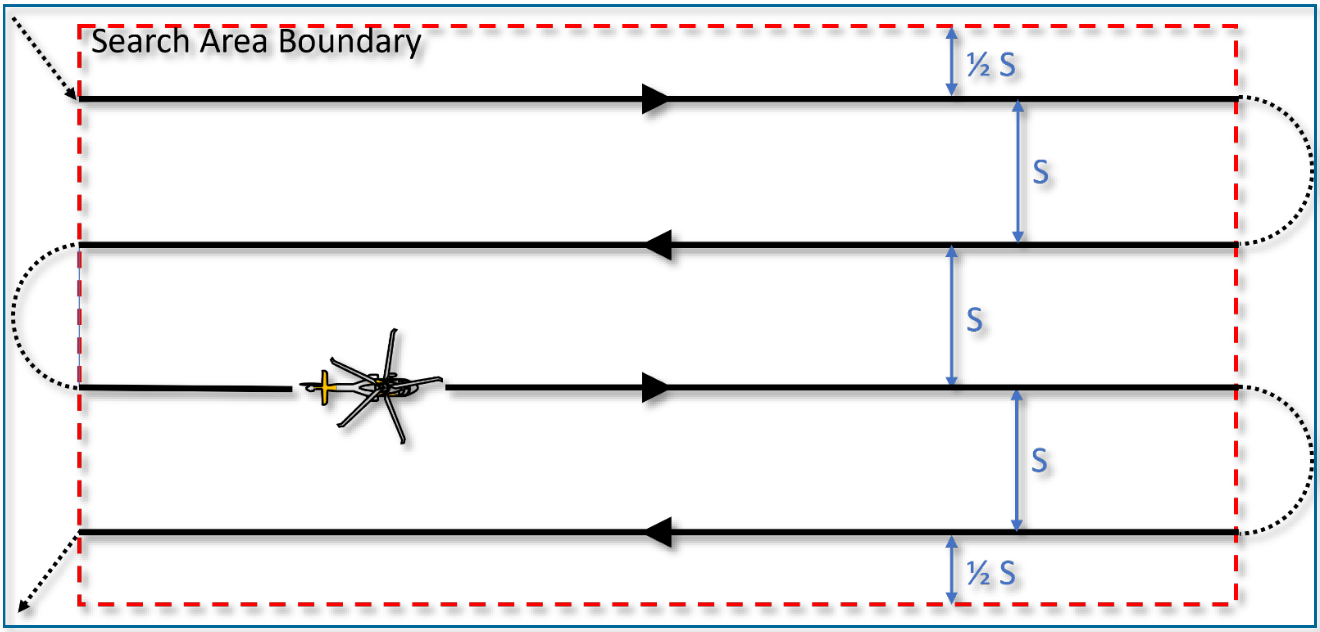
Track Line Search – Aircraft is returning back along track.

Parallel Search

Parallel track patterns are normally used when:

- The search area is large, and the terrain is relatively level, e.g. desert and maritime areas.
- Uniform coverage is required; and
- The location of the target is not known with any precision.

Search legs are aligned parallel to the major axis of the individual search area. The pattern is best used in rectangular or square areas. It is a very suitable pattern for a search conducted over water. The search aircraft proceeds from one corner of the search area maintaining parallel tracks, the first of which is at a distance equal to one-half the track spacing from a side of the area. Successive tracks are maintained parallel to each other and one track spacing apart. This type of search may be carried out by one aircraft or by several aircraft following parallel tracks or each searching smaller rectangular areas separately. When aircraft search hours and adjacent traffic permits, turns will be conducted outside the search area boundaries as shown below. This allows observers to rest and crew position changes.



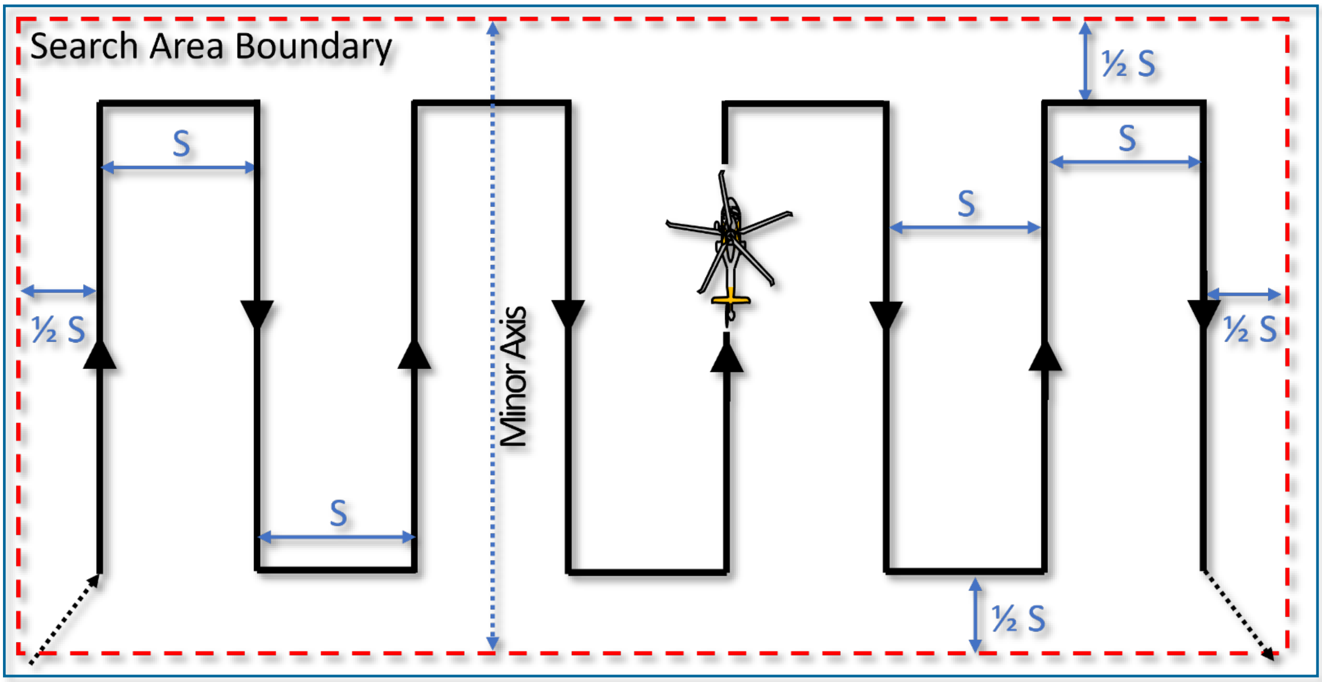
Parallel Track Search Pattern

When the search target is more likely to be at one end of the search pattern the search is aligned to the minor axis of the search area and becomes a Creeping Line Ahead Pattern the Creeping Line Ahead pattern is nominally aligned to a search targets track

In maritime areas where there is a high drift rate, care must be taken to ensure the target does not drift out of a SAR unit's area. This problem occurs when the rate of creep of the SAR unit is less than the rate of drift of the target.

When this condition exists some methods of resolving the problem are to:

- Align the SAR units search legs with the drift vector.
- Use shorter legs for the SAR unit to increase the rate of creep; and
- Increase the SAR unit's speed



Creeping Line Ahead Search Pattern

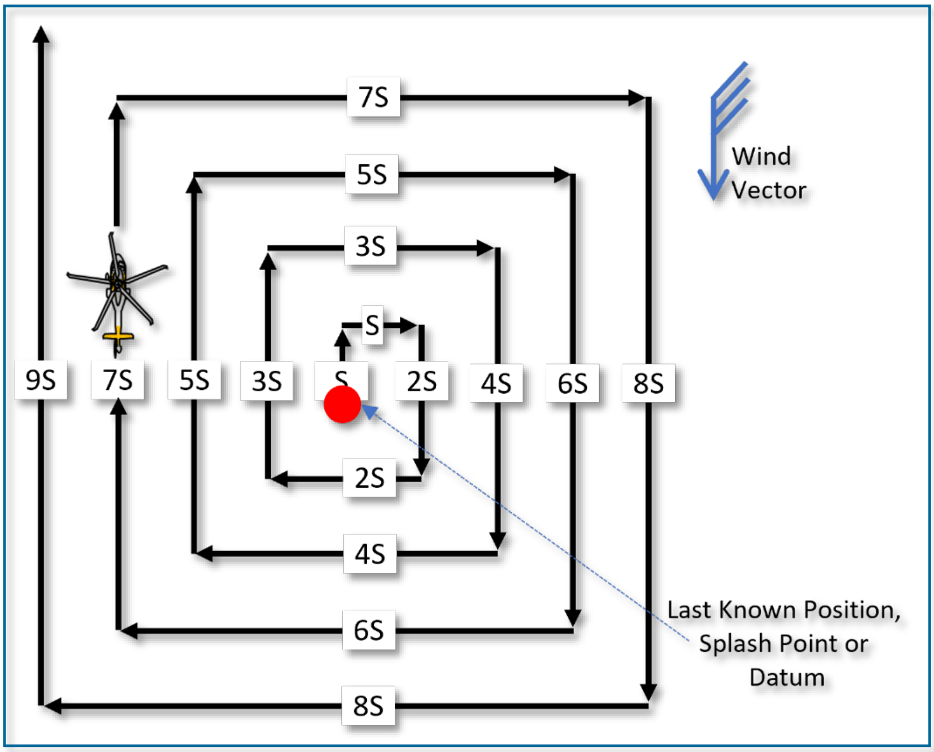
Expanding Square Search

This procedure is referred to as an expanding square search as it begins at the reported position or most probable location and expands outwards in concentric squares.

It is a very precise pattern and requires accurate navigation. To minimise navigational errors, the first leg is usually oriented directly into the wind. The square search pattern is used when the target is known to be in a relatively small area, no more than 15-20 NM from the start point. The first two legs are held to a distance equal to the track spacing and every succeeding two legs are increased by another track spacing. Turns may be to the left or right, depending upon the observer positions.

For successive searches, the direction of the search legs should be changed by 45 degrees. The final track should be the same as the initial search track from the start point. The number of search legs may be 5, or, increasing by increments of 4, 9, 13, 17 etc. Scanning should start at a distance of "S" before reaching the most probable position to avoid leaving an area not scanned near the start point.

Observers should be briefed to pay particular attention to the areas outwards of each turn to avoid leaving areas not scanned. The search should be planned so that, whenever possible, the approach to the most probable position, and the first leg, is made into wind as shown below

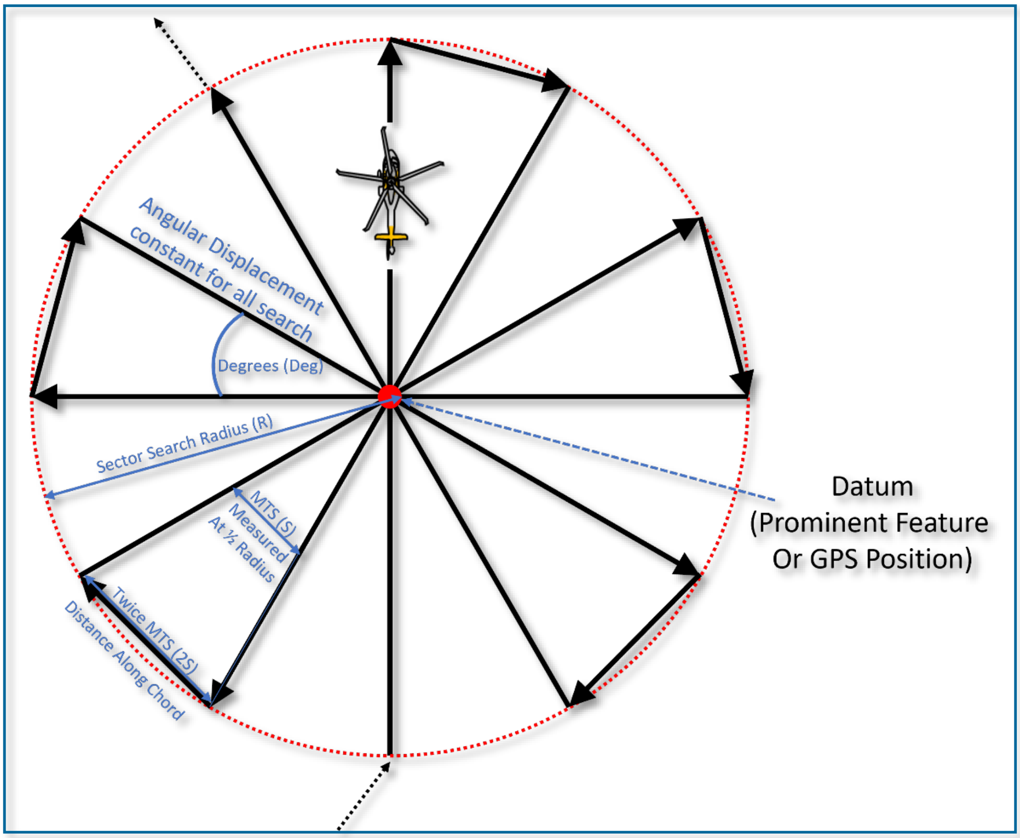


Expanding Square Search Pattern

Sector Search

This pattern may be employed when the position of distress is known within close limits and the area to be searched is not extensive. It is simple to execute, is likely to provide greater navigational accuracy than a square search and, because the track spacing is very small near the centre, it ensures a high probability of detection in the area where the target is most likely to be located. A suitable marker is chosen as a datum and navigation aid on each search leg. For practical purposes, the datum may be moved a mile or two, either at the planning stage or on scene, to take advantage of a prominent landmark well suited as a navigation reference. When using the pattern over water, it is useful to drop either a visual or electronic beacon to mark the datum. Adjustment for total water current is automatic and only leeway need be separately considered.

Each search leg is separated by an angle based on the maximum track spacing at the end of the legs and the search radius. For convenience, the angular displacement between each search leg and the distance required to fly the pattern for various track spacings and search radii may be extracted from Table 8-1, Sector Search Calculations. The table makes use of Mean Track Spacing (MTS) as a basis for deriving angular displacement and distance to be flown. MTS is the track spacing at a distance of half the radius of the search area from the datum. The table may also be used to determine the track spacing that can be used for a given track distance and search radius. The search start point may be either on the perimeter of the pattern or over the datum depending on the approach track of the search aircraft and the orientation of the first leg. To keep track computation simple, the first leg may be oriented to the north, but this is not essential. Successive tracks may be calculated by adding 90 degrees plus half the angular displacement to the previous track, and so on. The length of the cross leg is twice the mean track spacing. The coverage factor, obtained using sweep width information and mean track spacing, may be used to determine the POD. If a further sector search is necessary, it should be carried out on tracks plotted halfway between the tracks of the pattern followed during the first search



Sector Search Pattern

Note:

1 Deg = number of degrees between successive legs

D = total track distance (NM) to complete the search pattern

R = Sector Search Radius

S = mean track spacing (MTS)

2 The total track miles that an asset has available on search can be calculated by multiplying the effective time available on search – 15% by asset search speed.

SECTOR SEARCH CALCULATIONS

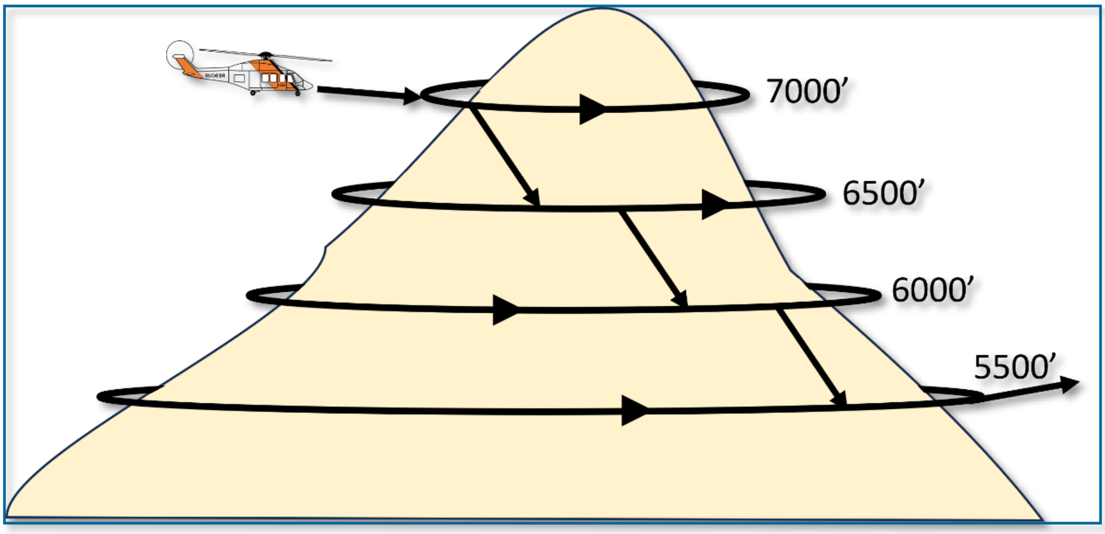
(This table must not be interpolated)

S	1 NM		2 NM		3 NM		4 NM	
R	**Deg**	**D**	**Deg**	**D**	**Deg**	**D**	**Deg**	**D**
5	24	90	48	45	72	30	100	30
10	12	330	24	180	36	120	48	90
15	8	720	16	375	24	270	32	210

Contour Search

A contour search procedure is used to examine mountain slopes and valleys when the nature of the terrain makes other types of search patterns ineffective or too dangerous.

The procedure normally requires the aircraft to commence at the highest level adjacent to the side of a mountain and then descend by appropriate altitudes. Altitude steps may vary to suit terrain.



Contour Search Pattern

The aircraft used must be suitable, that is, very manoeuvrable; capable of slow speed; having a small turning circle; and sufficient power to produce a "high" rate of climb.

The pilot should be experienced at flying in mountainous terrain.

Crews must be well briefed and possess accurate, large-scale maps showing the contour lines.

Weather conditions must be suitable, with particular consideration given to visibility, turbulence and cloud base.

Crews are reminded to exercise extreme caution when searching valleys. The valleys where climb-out or turn-around is difficult or impossible must be clearly identified.

All positioning turns must be made away from the mountainside. Only one aircraft is assigned to an area at any one time.

Before you carry out a contour search, consider the following points. Study the area on a map before departure, looking out for power lines, hidden peaks/ridges and blind valleys. Also, consider the wind direction and cloud base, and plan escape routes for:

- Turbulence.
- Weather.
- Downdrafts; and
- Single engine performance.

During flight, be aware of the following hazards and tips:

- Turbulence - never approach at more than 45° to a ridgeline etc.
- Power lines/cables.
- Fly to the side of valleys, not up the middle; this gives maximum turning radius.
- Birds.
- Shadowing, loss of distance perception.
- Other aircraft.
- Start at the top level.
- Check the area below when descending.
- Mark off areas not searched; and
- Look out for obstructions/hazards/other aircraft.

Note: These procedures are also shown in Enroute Supplement Australia / Emergency Procedures.

3.3 Principles of Observing

Almost anyone with reasonably good eyesight can learn to become an aerial observer. It is much the same process as learning to be a football player, swimmer, or anything else that requires well-developed and practiced coordination between the mind and body.

Effective aerial observation depends on keen vision, alertness, knowledge of “what to look for and where to look for it,” plus practice in the planned and disciplined use of the eyes. No skill of any kind can be acquired by merely reading about it or by a few moments of training. Most skills can be developed only with constant, directed practice and discipline.

Good aerial observation must be an integral part of flying, not an isolated accomplishment.

Seeing is an involuntary action performed by all persons with normal eyesight, whereas observing is a voluntary action of interpreting what is seen. The essential difference between the passive process of seeing and the active one of observing is that when observing, the brain not only records visual impressions but also makes deductions from what is seen.

IMPORTANT:

An alert brain is a prerequisite for observing

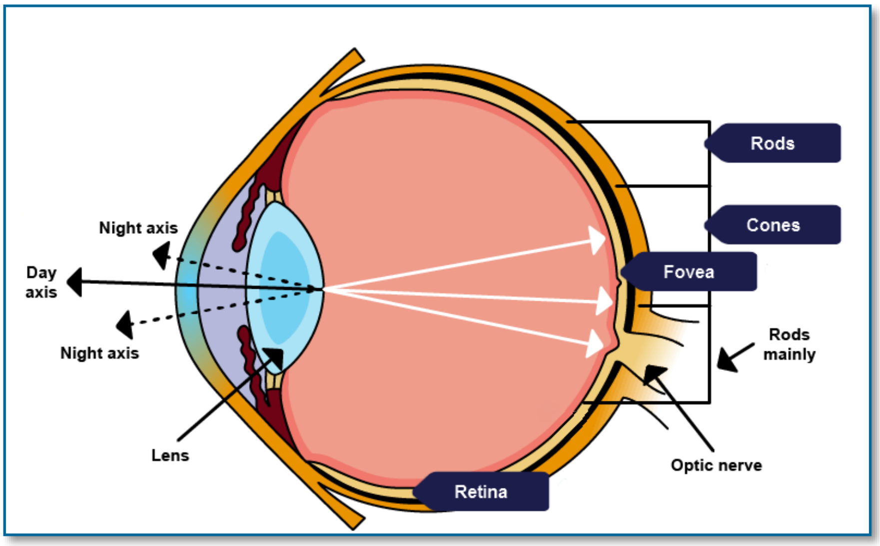
In summary, **SEEING** is a passive, involuntary activity where the brain records impressions, as opposed to **OBSERVING**, which is active and voluntary, requiring both **MENTAL** and **PHYSICAL** effort to allow the brain to make decisions.

3.3.1 Anatomy of the Eye

The **retina** is the part of the eye that concerns the observer most. At the back of the retina are the light receptor cells—**cones** and **rods**—which are light-sensitive and transmit electrical impulses to the brain.

The cones function primarily in daylight and provide colour vision.

The rods function under low illumination and provide vision only in shades of grey.



The cones, although distributed over the entire retina, are concentrated in one portion called the **fovea**. This region of the eye provides us with our best ability to discern detail and is located to coincide with straight-ahead vision.

The central region of the fovea, containing the highest concentration of cones (responsible for our colour vision and, due to their concentration, our visual acuity), is only around 1/10,000th of a millimetre across and subtends an angle of around 1/3rd of a degree of our straight-ahead vision.

The whole foveal area subtends approximately two (2) degrees. From 1,000 feet above ground (assuming you look straight down), the fovea scans in detail an area of around 10 metres, while the central fovea scans a mere 2 metres. Although the distance from the observer to the target would, in most cases, be greater than 1,000 feet and the ground area exposed to the fovea would be larger, detail in a scene is lost due to distance.

The physiological result of this is that humans best view things by "saccades." The saccade is a small series of steps with a brief pause before each step, made by the eye to bring the fovea to bear on the scene or object being scrutinised.

Towards the edge, the retina is only sensitive to movement. The extreme edge of the retina becomes even more primitive: when stimulated by movement, we experience nothing, but a reflex is initiated, which rotates the eye to bring the moving object into central vision.

The structure of the retina gives rise to two different forms of vision.

Focused Vision

In order to look at an object, the eye must be focused on the object, and when focused on a point, the area of focused vision is very small. Even the smallest object must be scanned (or, more correctly, “saccaded”) to be seen and recognised. This saccading consists of fractional movements of the sightline across the object, thus bringing the fovea into full play.

SACCADING:

"Movement of the eyes from one point of fixation to another"

Unfocused Vision

When looking at an object in a landscape, although the area of focused vision is small, the area of unfocused vision is large since the field of view of the eye is approximately 180 degrees. Near the area of focused vision, objects may be noted, but no detail will be seen, and the sensitivity falls off towards the edge of the field of view until, finally, only movement will be registered. This is the stage of "seeing out of the corner of the eye." This facility can be developed and will serve as a warning of objects not directly associated with the spot that the person is observing.

IMPORTANT:

The use of binoculars seriously reduces the area of unfocused vision

The rods, so light-sensitive that they function under low illumination, are distributed most thickly outside the foveal area. This causes an important peculiarity of night vision, i.e., by night, objects are often seen more clearly in a circular area around the point at which the eye is actually directed.

The light sensitivity of the eye is quite astounding, working as it does over a range of brightness of 100,000:1. The pigments of the retina are, however, temporarily bleached by bright light. This gives rise to the need for dark adaptation to acquire maximum sensitivity by night.

It also accounts for the "afterimages" seen after having looked at a brilliantly illuminated object.

3.3.2 The Visibility of Objects

Whether an object in a landscape is easy or difficult to see depends on several factors, most notably:

- Colour, tone, and texture
- Movement
- Form and shape
- Size and distance
- Contrast
- Glare

Tone

Is a quality compounded of colour and texture and is best described as the intensity of a particular colour, e.g., the "redness" of red or the "greenness" of a tree compared with that of a paddock of pasture. It is generally regarded as the most common cause of contrast and, therefore, of visibility.

Movement

A moving object is more readily detected than a static one. However, movement may be less apparent to a moving observer compared to a stationary one. For example, a hovering helicopter might detect movement that would not be seen during rapid flight.

Form and Shape

While colour, tone, and texture influence visibility, recognition primarily depends on form and shape. Form is detected partly because surfaces facing the light appear brighter than those turned away and partly due to the shadows created by the object's shape.

Size and Distance

There are two important aspects to consider regarding size.

Absolute Size

In the absence of any significant contrast or movement, the average eye typically does not detect an object subtending less than about 1/3 degree at the eye unless specifically directed to that spot.

In simpler terms, this means that a green vehicle, stationary against a natural background, is unlikely to be noticed at much more than 600 meters.

Of course, this is a broad generalization. The distance may be significantly increased with excellent lighting, good meteorological visibility, and particularly keen eyesight, or it could be substantially reduced under adverse conditions.

Relative Size

Relative size is important since contrast in size attracts the eye to an object that is larger or smaller than the pattern of its background.

For example, a small object such as a person or a distant vehicle stands out prominently against a large-patterned background, such as a vast field. Similarly, a large object, like a group of vehicles parked close together, is easily discerned against a small-patterned background, such as a field dotted with bushes and trees.

Against a featureless background, any object, large or small, will readily attract the observer's eye, as there are no other features to distract it. In contrast, a similar object against a background crowded with features and contrasts will be much less noticeable because the observer's attention is diverted and confused.

Contrast

Look at a black and white photograph. Originally, it was a white sheet of photographic paper. However, varying shades of grey have been chemically reproduced on it to create a "picture" of the subject. A colour photograph simply adds colours in varying intensities. Just as a camera captures the contrast between light and dark and, therefore, "sees" objects, your eyes interpret a scene by the contrast of light and dark or different colours.

Contrast (with movement being a close second) is the most important factor in observing things efficiently from an aircraft. Objects on the ground cannot be seen unless they contrast in some manner with their background. For instance, a brown object against a brown background cannot be distinguished unless it casts a shadow, which produces contrast in light or dark, or has a distinct form that breaks the background or horizon, which also creates contrast. Without contrast, you cannot see it.

Nature sometimes helps the observer with contrast and other times makes it difficult. Observers must be aware of these differences to observe effectively.

Contrasting colours stand out clearly from low altitudes. At high altitudes, all colours tend to fade due to increasing atmospheric haze. Consequently, at low altitudes where colour can be seen, more detail will be visible, and the significance of colour contrast can be better interpreted. It is, therefore, important that observers have normal colour vision

Glare

Glare has the greatest impact on efficient sight. You should make every effort to eliminate or reduce it. Glare occurs when there is more light than your eyes can handle, causing your visual mechanism to stall. The over-stimulation caused by glare can even result in temporary blindness, confusion, and sometimes pain.

Aircrew or observers should wear good-quality sunglasses or tinted visors that reduce the total amount of light reaching their eyes while still permitting good vision whenever the sun is strong enough to cause eyestrain.

For observers, a comfortable cloth cap with a peak (eye shield) will significantly reduce problems with eye squinting resulting from direct sunlight and reflections. Poor-quality glasses make seeing more difficult. Coloured (tinted) glasses are not desirable for observation work as they filter out certain colour values and make detection of camouflage difficult.

Other sources of glare, often overlooked, include dirt and scratches on glasses, visors, and the glazing of the windscreen. You may not notice these defects until they become critical when flying into the sun, as the glare they create may become severe.

Scratches and dirt on the windshield develop gradually, so you might not be aware of the increasing distraction and subsequent loss of vision. Every effort should be made to keep windscreens clean and polished.

An additional cause of glare is bright or light-coloured clothing worn by some observers. Orange overalls and light or bright shirts and blouses should be assessed for their suitability prior to flight.

Observers' clothing should be loose-fitting and comfortable. Solid footwear should be worn while airborne.

Recovery from overexposure to glare takes time. Prolonged exposure to excessive light will reduce your ability to see details in low light, thus impairing both night vision and day vision. These effects may last for several days even after the eyes are rested.

Fatigue from any cause impairs vision, particularly night vision, and usually without your awareness. Searching requires alertness over long periods. When your eyes get tired, you may strain them in trying to continue a normal job. When fatigued, attention may be maintained for only short periods, but overall efficiency is lowered, and you are likely to miss something significant. General fatigue also affects your sight because it makes it more difficult to stay focused, slows coordination, and causes poor judgment.

Visual Images

There is evidence to suggest that the human optical system operates as a “feature construction” process. The brain does not simply project a photographic replica of the outside world; instead, it constructs a picture from components of visual input, a repository of visual memories, and a catalogue of learned rules concerning perspective and various optical characteristics.

Visual Inference

Visual inference is a valuable tool for the observer. It involves recognizing targets by connecting seemingly insignificant details, thereby inferring the presence and position of important objects. Even if the actual equipment is not visible, other clues such as dust, an unnatural break in a hedgerow, or vehicle tracks may indicate activity in an area, prompting the observer to search more closely. This ability to make visual deductions improves with practice.

Visual Memory

Visual memory is the brain's ability to retain an image as seen by the eyes and to compare it with subsequent images, noting any differences. A trained observer can detect changes in the terrain from when they last scanned it. Any movement occurring during the intervening period should remain noticeable for a long time. Even a slight change in the position of an object, a new track, or an altered shadow should immediately attract attention.

Night and Poor Light

Recognition of objects in daylight relies on various factors, including shape, form, colour, and overall appearance. Cones, concentrated in the centre of the retina, enable precise visual acuity during the day.

At night or in poor light, many visual cues are absent, making objects appear unfamiliar. White objects become more conspicuous, while greys, browns, and greens blend together. It is crucial for an observer to be familiar with how a particular object appears under these conditions.

At night, the rods, which are concentrated around the centre of the retina, become the primary receptors. Objects a few degrees off the direct line of sight are imaged on this part of the retina, which is most sensitive in low light. To compensate, the eye should be directed approximately 8 degrees off-centre. Determining the optimal direction for this offset—whether above, below, or to the side—requires individual experimentation.

Practice and confidence are essential to avoid the temptation of looking directly to confirm what has been seen.

Hypoxia

Hypoxia, or lack of oxygen, significantly impairs visual ability. As anoxia progresses, the eye becomes less sensitive to details and contrast, the overall field of vision narrows, peripheral vision diminishes, and everything appears dimmer.

Another severe effect of hypoxia is a diminished capacity to concentrate.

To prevent hypoxia, avoid factors that deplete your body's oxygen supply. Poor physical condition, carbon monoxide poisoning, and cigarette smoking are major contributors to reduced oxygen availability.

Additionally, ensure you're not hungry. Observers who fly on an empty stomach perform notably worse compared to those who are well-fed and comfortable.

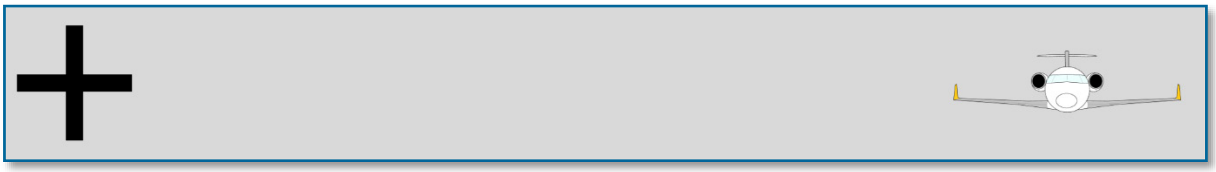
The Day Blind Spot

The day blind spot occurs due to the position of the optic nerve in the retina, where there are no rods or cones (light receptors) to detect light.

Main concerns about blind spots:

- Awareness: Understanding that blind spots exist.
- Management: Knowing how to compensate for them.

When an object is in your blind spot, it will not be visible to one eye. The diagram below illustrates this concept.



Cover your left eye with your left hand and focus steadily on the cross on the left. Slowly move the page away from your face. When the plane moves into the blind spot of your right eye (approximately 30 cm away), it will disappear.

Blind Spot Effects - Cone of Blindness

- At 1 foot (30 cm) from the eye: 1 inch (2.5 cm) in diameter
- At 1000 feet (~300 m) from the eye: 90 feet (~30 m) in diameter
- At one mile (1.6 km) from the eye: 520 feet (~160 m) in diameter

For perspective, a Boeing 747 jet is 150 feet (~46 m) long.

Under normal conditions, blind spots are not a major issue because both eyes are used together. An object in the blind spot of one eye is typically seen by the other eye. However, if an obstruction, such as a windshield post, blocks the view of one eye, objects in the blind spot of the other eye may not be visible. To address this, use both eyes, systematically scan your entire field of vision, and move your head frequently while searching.

Both eyes work together, and each can move independently. When you observe an object, the lines of sight from both eyes converge on that point, giving you slightly different views. This disparity helps your brain perceive depth, as well as height and width. The convergence angle provides distance information, which your brain uses to gauge range. While optical instruments can affect the perception of depth, normal viewing instruments typically reduce the brain’s ability to judge distance.

3.3.3 How to “Look” from the Aircraft

Search distance, derived from tables, represents the range at which you should be able to see an object from the height at which the aircraft is flying. This figure is intentionally less than the maximum observable distance to ensure a high probability of spotting the target.

Practicing Search Technique

Observers should practice this technique before each search. To do this, fly the aircraft at the distance derived from the table (half the track spacing) from an object at the beginning of the flight. Observers should saccade out to the object at the required distance and note a reference point on the window or another part of the aircraft. This provides a good guide for measuring search distance in the search area.

Systematic Scanning

To effectively cover an area, Observers must look directly at every spot in the area. This requires planned, continuous systematic saccading of the area. Observers will not use binoculars continuously during an air search because the tubular construction of binoculars eliminates peripheral vision, and distance cannot be accurately judged with them. Binoculars should generally only be used to confirm sightings.

Eye and Head Movement:

The correct eye/head movement involves a series of small steps from below the aircraft out to the sighting range and then back, while the aircraft advances across the terrain. The eyes naturally move and pause in about 4-degree jumps, and sightings are most likely when the object is within 5 degrees of the point on which the eyes are focused. When saccading through a window of an aircraft, eye/head movement should be a repeated series of sweeps from below the aircraft, out at right angles to the aircraft’s heading, to the limit of the briefed search distance and then back. To reduce fatigue, it is suggested to move the head rather than just the eyes.

Saccading Speed and Focus

The eye/head movement should be about 10 degrees per second (depending on aircraft speed and height), pausing every 3 to 4 degrees to focus—i.e., two to three pauses per second. This is because the eye must be focused on an object within its sight line (or within a 5-degree radius of it). Avoid skipping the eyes too far between focus points, as the eye does not see clearly while in motion. The pauses should be long enough to enable the eye to register and identify distant objects.

Optimal Saccading

The speed of saccading depends on the aircraft’s speed and height. Ideally, it should be as slow as possible, taking into consideration the speed and height of your aircraft, the size of the area to be covered, and the size of the search object. Saccading too fast will cause you to lose considerable detail, while saccading too slowly will result in missing some areas.

Briefing

Before boarding the aircraft, ensure you brief the Observers thoroughly. Pay particular attention to the following:

- **Description of the Object:** Clearly describe the object of the search to the Observers.
- **Track Spacing:** Emphasize the track spacing, noting that half of this distance will be your search distance.

Objects to Look for

The "object" you are searching for differs from everyday viewing in that its exact appearance may be unknown. For instance, you might be looking for a specific aircraft, but it might no longer resemble an aircraft. It could be twisted metal, charred debris, or even an intact aircraft with occupants standing around.

The primary objective of our search is to find and retrieve people alive. If they are injured, quickly establishing their location can be crucial to their survival.

This is where the skills of your Aircrew or Air Search Observers become vital.

Over Land

Over Land, you are looking for:

- The aircraft, as described on the Air Search Briefing form.
- The number of people, who may be able to signal their presence with smoke, fires, mirrors, or ground signals.
- Unusual metal objects: shiny, coloured as per description, or blackened and charred, possibly scattered over an area.
- Recent scarring of ground or vegetation.
- An unusual piece of vegetation missing, such as a part of a tree.
- Unexpected rubbish. Observers have reported that the first clue to a crash scene was spotting what appeared to be a rubbish tip. Many Australian farms have their own rubbish tips, so ensure each one in your search area is checked to rule out a crash scene.

Over Water

Over Water, you are looking for:

- Oil slicks.
- Any floating objects, including wreckage and debris.
- Heads or lifejackets (typically orange or yellow).
- Life-rafts.
- Sea marker dye (brilliant green or orange).
- Signal rockets, flashing lights, sunlight reflecting off mirrors, etc.
- White caps that remain in the same location.

3.3.4 Actions on Sighting a Target

When a possible target is sighted, efficient crew coordination and fast, smooth teamwork are essential. No crew member should dismiss any potential clues out of fear of making a mistake. Each possible sighting must be properly investigated, as it could be the key to saving someone's life. Ten percent of the aircraft's available search time is already allocated to investigating possible sightings. Observers will report any potential targets to you.

IMPORTANT:

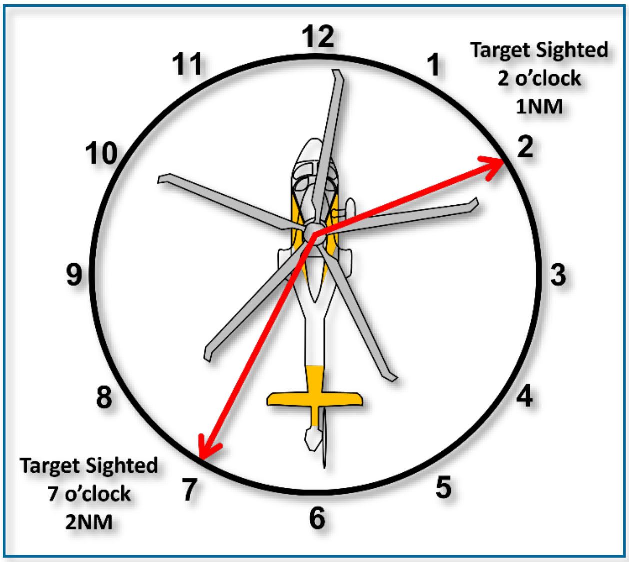
The crewmember making the sighting should not remove their eyes from the target as they report the sighting

The crewmember making the sighting is to call

"TARGET SIGHTED - TWO O'CLOCK, 1 Mile."

The clock method is used to report the sighting, where directions are given as "clock direction and distance." Here's how it works:

- 12 o'clock: Directly ahead of the aircraft.
- 3 o'clock: Abreast to the right of the aircraft.
- 6 o'clock: Directly behind the aircraft.
- 9 o'clock: Abreast to the left of the aircraft.



NOTE:

Regardless of your seating position, the nose of the aircraft is always 12 o'clock

For distance, the Observer will not strive for accuracy but will give an initial distance and update you as required. The important information that must be accurate is the direction.

When over land, it may be possible to assist in locating the target by referencing surrounding geographical features.

If over water, the aircrew may deploy a smoke marker and/or sea dye (this action will be pre-briefed and authorised by the pilot).

You will also mark the target using the GPS.

When Confirming the Object Found

- Save the current position on the GPS or write down the latitude/longitude.
- If over land, relate the position of the target to an obvious geographical feature (bearing and distance), assess the best access route for ground parties, and estimate the distance from the nearest road.
- Get the crew to carefully observe the target and note the number and condition of all survivors.
- Advise the ARC of the situation via ATS (on area frequency), mobile, or satellite phone.
- If a Hoist is required

  - Advise ARC of the situation and hoisting plan.
  - Follow all company procedures for hoisting operations.
- If a drop is required, have the crew prepare the SAR drop supplies.
  - Obtain ARC approval to drop emergency equipment if time permits.
  - Advise the ARC via ATS that you are commencing a drop pattern and may be off the air/ground communications frequency for a period of time.
  - Maintain communications on 123.1 MHz with other aircraft in the search area.
  - Conduct the supply drop and assess the result. Advise the ARC of the result.
- Remain overhead to act as top cover or track as required by the ARC.
- Advise the ARC of your latest divert time.
- The crew will keep the object (possible target) in sight as you manoeuvre the aircraft.
- You will turn the aircraft to circle the target.
- The crew will continue to call out revised directions and distances until you have the object in sight.
- If the object is very small, such as a head in a life jacket in the water, the crew will arrange a roster between themselves to keep it in sight.
- Once the target is positively identified, it can be marked using any or all of the following, depending on whether it is on land or in the water, and based on the circumstances:
  - Additional smoke markers
  - Strobe marker—typically used in poor visibility or approaching darkness
  - SLDMB
  - Sea marker dye—usually taped to the smoke marker, but can be dropped separately if needed

3.3.5 Crew's Discretion

Every effort should be made to keep the ARC informed of the situation. Similarly, the ARC will attempt to keep the crew updated. However, if communication breaks down, the crew must use their discretion to resolve the situation.

Consider the following factors:

- Last light
- Fuel state
- Weather conditions
- Survivors’ situation
- Other operational considerations

The overriding principle is that the safety of the aircraft and crew must not be compromised at any stage.

3.4 Day Visual Air Search Operations

There are many signals that can be used to indicate a distress or other emergency.

Personnel involved in SAR operations must be familiar with the types of signals they can expect to encounter in order to evaluate their meaning correctly and take appropriate action.

These emergency signals may be made by radio, satellite, telephone, texting, internet (email, social media, etc.). RADAR (e.g. transponders), flags, pyrotechnics, flashing lights, smoke, sounds, shapes and ground panels. (Appendix V-3 lists the more common signals in use.)

3.5 Night Vision Device Aided Air Search Operations

The use of Night Vision Devices (NVDs) can be effective in searches conducted by various types of search units. The following factors may influence the effectiveness of NVDs for searching:

- NVD quality
- Crew training and experience
- Environmental conditions, including visibility, moonlight, cloud coverage, and rain
- Level and glare effects of ambient light, both natural and artificial
- SAR asset speed
- Height of the observer above the surface
- Surface conditions (e.g., snow, sea state)
- Size, illumination, and reflectivity of the search object; the presence of reflective tape greatly enhances detectability
- Types of survival equipment or light sources used by the survivors

Glare should be minimized as much as possible within the facility where NVD users are stationed. This may involve opening or removing windows where practicable. Proper scanning techniques are also important to reduce the adverse effects of moonlight or artificial light sources, such as lighthouses, offshore rigs, ships, navigation lights, and strobe lights.

Visible moonlight can significantly enhance the detection of unlighted search objects when using NVDs. Light sources on search objects, such as strobe lights or even cigarettes, can greatly improve detection, even in poor visibility conditions.

The ARC will discuss the sweep width needs with the crew conducting the search. any mission using NVDs.

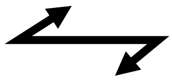
3.6 FLIR Air Search Operations

Infrared (IR) devices, such as IR TV cameras or Forward-Looking Infrared Radar (FLIR), are passive detection systems used to detect thermal radiation. They operate by detecting temperature differences to produce a video picture, allowing them to often detect survivors by their body heat.

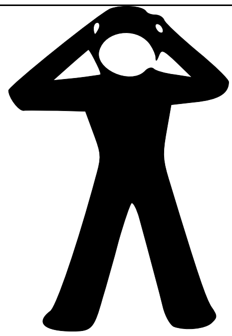
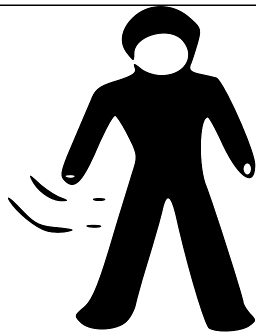
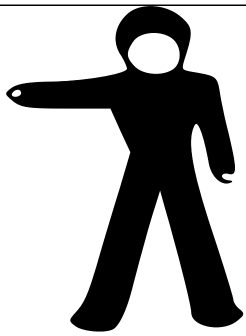
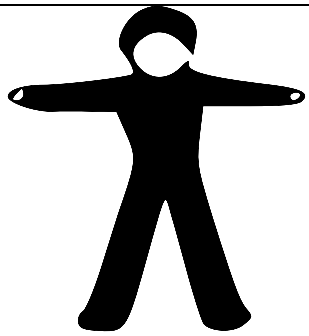
IR devices are generally preferred for night use. The search height should normally be between 200 and 500 feet AGL (Above Ground Level) for small targets, such as persons in the water, and can be increased to a maximum of approximately 1,500 feet AGL for larger targets or those with a larger heat signature. Track spacing should be determined in consultation with the operating crew, considering the effective detection range provided by the FLIR system manufacturer and the Field of View (FOV) angular limitations of the device.

APPENDICES VOLUME 3

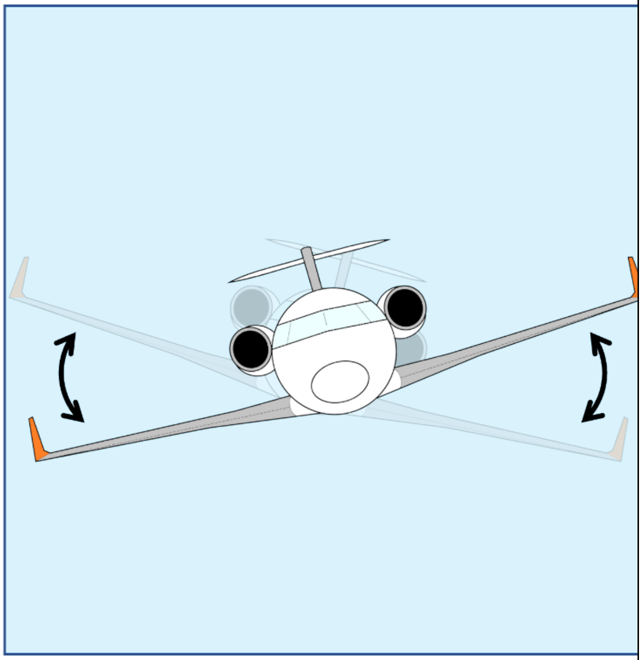
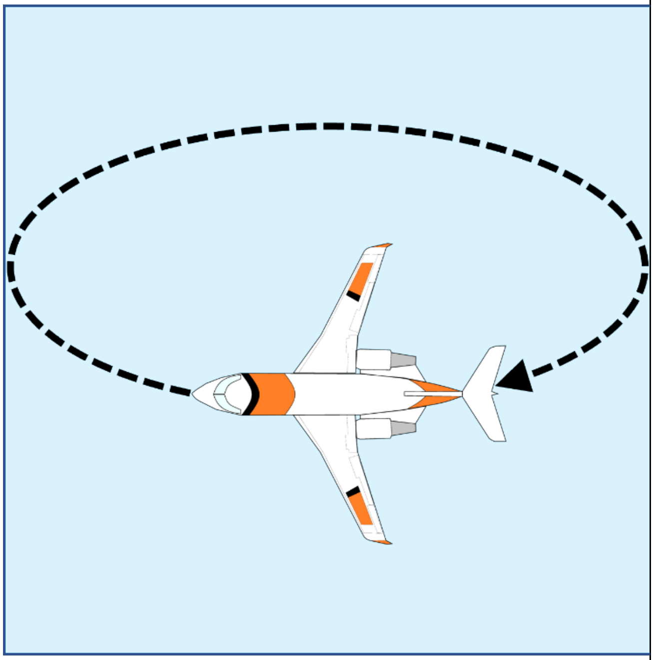
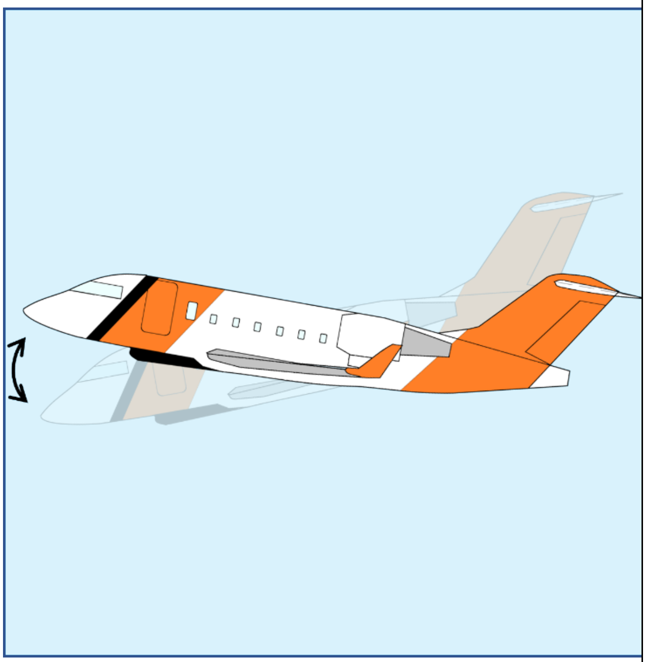
Appendix B – Ground To Air Visual Signals

GROUND to AIR VISUAL SIGNALS	
Ground – Air visual signal code (Survivor)	
Message	**Code Symbol**
Require assistance.	**V**
Require medical assistance.	**X**
No or Negative.	**N**
Yes, or Affirmative.	**Y**
Proceeding in this direction.	↑
Ground – Air visual signal code (Rescue Units)	
Message	**Code Symbol**
Operation completed.	**LLL**
We have found all personnel.	**LL**
We have found only some personnel.	**++**
We are not able to continue. Returning to base.	**XX**
Have divided into two groups. Each proceeding in direction indicated.	
Information Received that aircraft is in this direction.	→→
Nothing found, Will continue search.	**NN**

Appendix C – Ground To Air (Body) Visual Signals

GROUND to AIR (BODY) SIGNAL CODE		
	Need Medical Assistance	Our Receiver is Operating
		
Use Drop Message	Affirmative (Yes)	Negative (No)
		
All O.K. Do Not Wait	Do Not Attempt to Land Here	Land Here
		
Can Proceed Shortly Wait If Practical	Need Mechanical Help Or Parts	Pick Us Up Plane Abandoned

Appendix D – Air To Ground Signals

AIR to GROUND SIGNALS	
	
Message Received and Understood (Rocking Wings)	Message Received and Not Understood (Circling)
	
Affirmative (Pitching Nose Up and Down)	Negative (Yawing Left and Right)

Appendix E – Civil Air-Ground Code

Australian Civil Authorities Air-Ground Code (IAMSAR Standards):

Signal	Meaning
Aircraft orbits ground party at low level changing engine noise	I require your attention
Aircraft flies' overhead ground party at low level and sets off in a particular direction.	Follow aircraft in same direction
Aircraft rocks wings and orbits.	Investigate object/position underneath aircraft orbit
Aircraft drops smoke on a particular location	Investigate object/position adjacent to smoke
Aircraft drops message canister.	Retrieve and read instructions contained in the canister

Aldis Lamp Signals

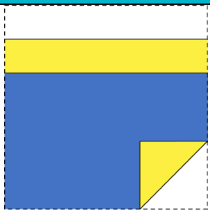
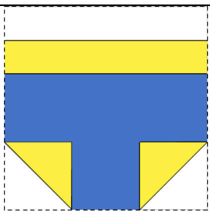
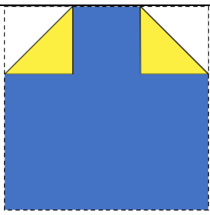
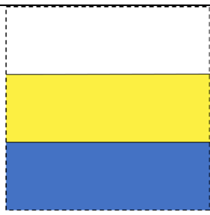
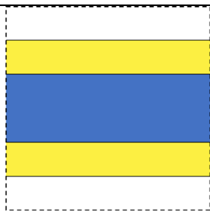
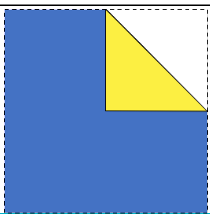
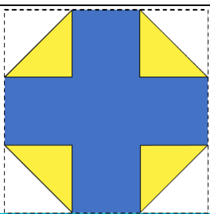
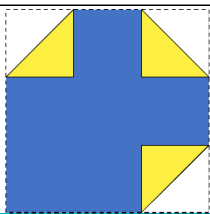
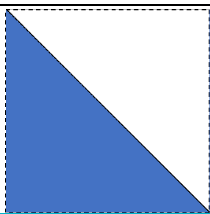
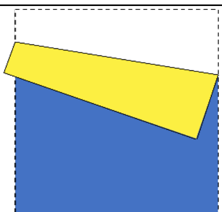
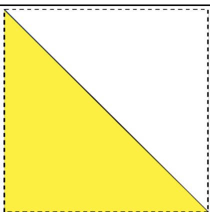
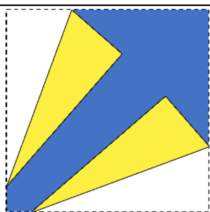
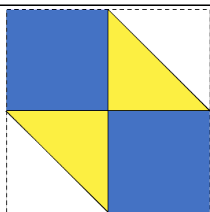
- *Red flashes indicate not understood*
- *Green flashes indicate message understood*

Air-Ground Signals

- *The following signals by aircraft mean that the signals have been understood:*
  - *During hours of daylight - rocking the aircraft's wings*
  - *During hours of darkness - by flashing the aircraft's landing or navigation lights ON and OFF twice.*

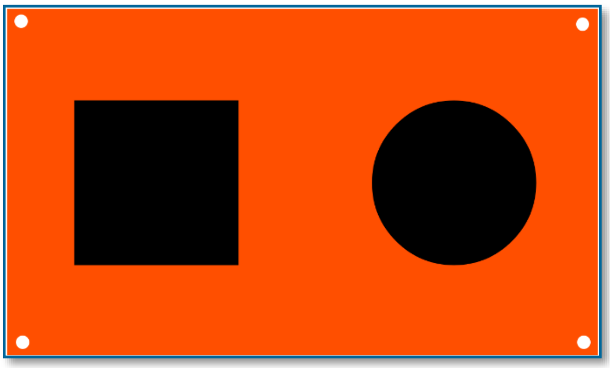
Lack of the above signals indicates that the message has not been understood

Appendix F – Panel Signals

PANEL SIGNALS			
 **On Land** Walking in this direction **At Sea** Drifting	Survivors can use liferaft sails to convey signals **NOTE:** Any square piece of cloth or canvas with each side of contrasting colour can be used.		
 **On Land** Need Quinine or Atabrine **At Sea** Need sun cover	 **On Land** Need Warm Clothing ***At Sea*** Need Exposure Suit or clothing indicated	 **On Land** Should we wait for rescue plane? ***At Sea*** Notify rescue agency of my position	 **On Land** Indicate direction of nearest civilisation ***At Sea*** Indicate direction of rescue craft
 **On Land** Need gas & oil; plane is flyable	 **On Land & Sea** Need medical attention	 **On Land & Sea** Need first aid supplies	 **On Land & Sea** Need equipment indicated. Signals follow
 **On Land & Sea** Plane is flyable; need tools.	 **On Land & Sea** Need food & Water	 **On Land & Sea** Ok to Land. Arrow show landing direction.	 **On Land & Sea** Do Not Attempt Landing

Appendix G – V Sheets

An internationally recognised distress signal is an orange or red coloured cloth or canvas. Sometime referred to as **V** Sheets. These sheets will either have superimposed the black square and circle, or the more common (in Australia) black **V** as shown below. This type of distress signal is in common use by small marine craft in Australian coastal waters.



Supply Drop Operations

4. SUPPLY DROP OPERATIONS

4.1 General Supply Drop Procedures

The conduct of a search, whether electronic or visual, may result in detecting a situation where a target requires assistance. This assistance may include, but is not limited to:

- Dropping life rafts and equipment to persons in distress.
- Lowering trained individuals from helicopters.
- Evacuating survivors by helicopter.

Additionally, search operations may require intelligence for search planning to determine potential drift or tidal flow in order to ascertain the likely drift location of survivors in the water. In such cases, the search aircraft may deploy a Self-Locating Datum Marker Buoy (SLDMB) over water to measure water movement and sea surface temperature.

Equipment to be deployed from rotary-wing (RW) aircraft must be specifically approved for such use for the specified aircraft. Deployment of AMSA SAR equipment will only be carried out in accordance with relevant AMSA procedures by qualified and current aircrew.

4.2 Supply Drop Equipment

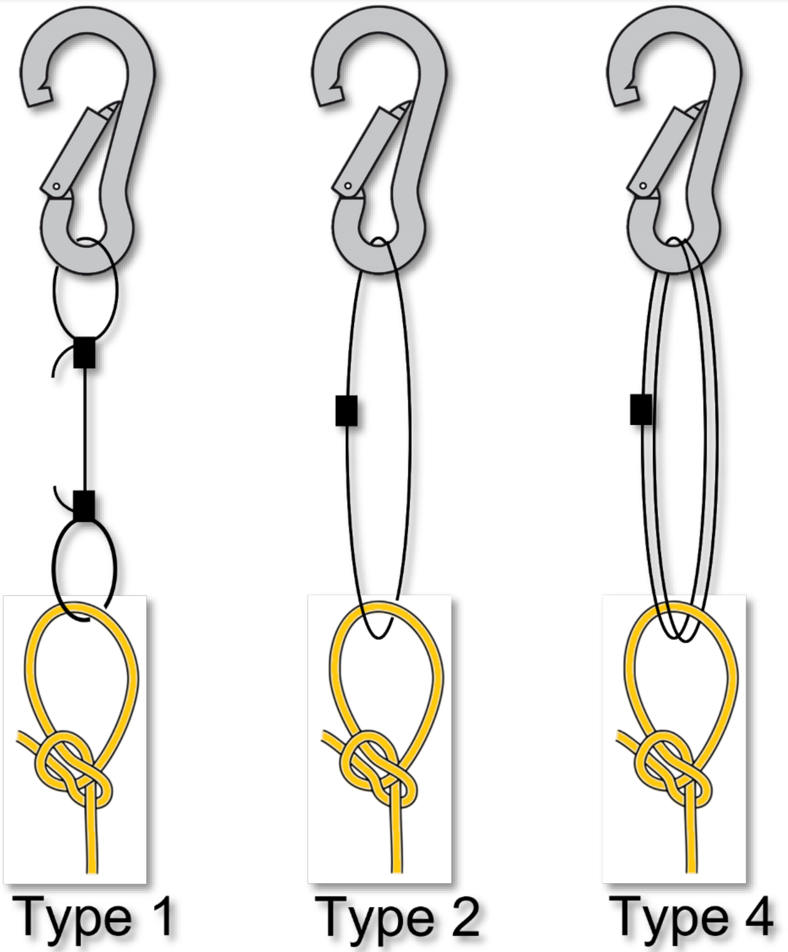
AMSA-approved equipment for deployment from rotary-wing (RW) aircraft includes:

- Life rafts (6 person – Switlik SAR 6 Mk 2)
- Helicopter Delivery Line Kit
- Helicopter Lightweight Delivery Line Kit
- Self-Locating Datum Marker Buoys (SLDMB)
- Message Bags
- Visual Markers (strobe lights, sea-dye packs, and pyrotechnics)

A list of SRU-supplied equipment is provided in Appendix I of this chapter.

4.3 Weak Links

Weak links are a crucial component of most dispatchable stores. To ensure that the stores operate reliably and detach from the aircraft without causing an overload, it is essential to use weak links of the correct strength. The types of weak links referenced in this manual are outlined below. Type 4 links should only be used as a backup (i.e., they are intended to be loaded to breaking load only if the primary link is bypassed due to a tangle or other issue).



Strength Values

Tested with P/N DTD 786E Nylon Cord from Australian Rope & Cordage

TYPE 1	TYPE 2	TYPE 3
785 N 176 lb 80 kg	1,094 N 246 lb 112 kg	2,345 N 527 lb 240 kg

IMPORTANT:

Type 1 is used on all stores in this manual

4.4 Life Rafts & Ancillary Equipment

4.4.1 Helicopter Delivery Line Kit

The Helicopter Delivery Line Kit (HDLK) is designed to enable the retrievable delivery of a life raft to a vessel or survivor in the water.

USE:

The Helicopter Delivery Line Kit (HDLK) is used as part of the life raft deployment procedure. The HDLK allows the RWR crew to positively dispatch a raft and ensure its retrievability, maintaining a constant connection to the life raft. The kit also includes safety lines to assist survivors in safely transitioning to the deployed raft.

RWR SRUs are supplied with a Training Helicopter Delivery Line Kit, which is clearly marked "TRAINING."

CONSTRUCTION:

The HDLK is comprised of two components:

Helicopter Delivery Bag

- 9 x Safety Lines (for survivor attachment)
- 1 x Safety Knife (for emergency cutaway)
- 1 x Instructions for Helicopter Rescue Booklet
- 3 x 2 Kg ballast weights (removable)

Helicopter Delivery Line Bag

- 71m of buoyant rope,
- 100mm Snap Hook on draw cord
- 100mm Carbine Hook
- 100mm Formed Eye Snap Hook
- Instruction Tags on 30 mm split rings.

The delivery line is fitted with a red sleeve on the buoyant rope, indicating that approximately 30 meters of rope remain in the Delivery Line Bag.

OPERATION:

The operation of the HDLK is outlined in the Switlik SAR 6 Mk 2 Operation section.

TESTING & MAINTENANCE.

Pre Flight:

- Delivery Line Bag
  - Uncoil all buoyant rope and repack it. This will ensure the rope will deploy smoothly from the Delivery Line Bag without knots.
  - Check Orange Tags are fitted
    - "Remove Bag" tag fitted to the snap hook end of the delivery line
    - "Connect to Life Raft Webbing" Tag connected to the carbine hook end of the delivery line
- Helicopter Delivery Bag
  - Remove weights if dispatching to a person in the water.
  - Check contained items for serviceability

Post Training:

- All Training equipment must be properly cleaned with fresh water to remove any contaminants such as salt, dirt & mud.
- Hang the equipment in a cool, shady place to dry.
- Inspect all components for damage or wear.
- Repack the equipment correctly.

4.4.2 Switlik SAR 6 Mk 2 Life raft.

The SAR-6 MKII Life Raft is a 6-person (10-person overload) blue water offshore life raft. The SAR-6 MKII is also an air-droppable life raft.

USE:

The Switlik SAR 6 is generally used in the marine environment if recovery by helicopter is not feasible or if recovery can be assisted by the supply of the raft. Persons in the water and vessels in distress which may require abandonment are situations where a life raft dispatch may be considered.

Additionally, due to the limited capacity of some helicopters, not all survivors may be rescued at one time, in which case the dispatch of a life raft may be necessary to support the remaining survivors until the helicopter can return or another asset can assist in recovery.

If it would take too long to reach survivors by land, or if providing shelter to survivors is crucial, it may be appropriate to drop one or more life rafts from the air, even overland, to provide ongoing or long-term shelter.

CONSTRUCTION:

The SAR 6 Life Raft features dual buoyancy chambers made of heavy-duty nylon coated with abrasion-resistant urethane, a fully auto-erecting canopy, and a large toroidal stability device. AMSA heavily modifies the contents of the SAR 6 life raft to suit Australian SRR operational conditions.

AMSA's Operational rafts generally contain the following survival equipment.

Item	QTY	Item	QTY
Bailer	2	Paracetamol Tablets (Packet)	1
Batteries AA	9	Rescue Bags (Thermal Protection)	9
Cyalume Light	2	Scissors	1
Emergency Rations	1	Sea Marker Dye (40g)	2
Emergency Water	6	See-Blitz	1
EPIRB (See Note)	1	Signal Mirror	1
First Aid Kit	1	Signal Rocket (Parachute red)	2
Ground Air Code Label	1	Sponge	10
Hand Pump	1	Sunscreen 50ml	1
Lip Balm	1	Survival Manual	1
Mechanical Patches (Set)	1	Marine Transceiver (GMDSS)	1
Motion Sickness Tablets (Packets)	2	Water Carry Bag	1

NOTE:
The EPIRB is not automatically activated on raft inflation. The EPRIB is stored with the survival equipment in a pouch on the floor and is required to be manually activated by the survivor.

OPERATION:

Vessel Briefing:

Where possible, communications should be established with the vessel to brief them on the raft dispatch procedure. The procedure is complex and relies on assistance from untrained and potentially distressed civilians. It is important that the vessel's crew understand that a life raft will be deployed from the helicopter. Once the vessel has the Delivery Bag, it should be disconnected from the buoyant rope, and the buoyant rope should be attached to the vessel. Further instructions are contained in the Delivery Bag.

Simple instructions should be passed to the vessel, such as:

- We are going to deploy a life raft.
- We will lower a bag on a rope to your vessel.
- Remove the bag from the rope and then attach the rope to a strong point on your vessel.
- We will back up and deploy the life raft.
- Further instructions are in the bag.
- "DO YOU UNDERSTAND?"
- "PLEASE READ BACK THOSE INSTRUCTIONS."

The vessel crew should indicate they understand and read back the instructions correctly. If they don't, the crew are to **REPEAT THE INSTRUCTIONS!**

If, even following the deployment of the Radio Bag, clear voice communications cannot be established, the Helicopter Delivery Bag is to be lowered to the vessel with the expectation that the vessel's crew will read and understand the instructions printed on the outside of the Delivery Bag and read and understand the instructions contained in the "*Instructions for Helicopter Rescue*" booklet found inside the Delivery Bag.

The main consideration here is that without clear voice communications, the vessel's crew may not understand what is required of them and detach the Delivery Bag and throw the buoyant rope overboard. If this occurs, the Aircrew Officer is to retrieve the buoyant rope into the helicopter, attach a weighted bag and re-lower the rope to the vessel. At this point, the crew of the vessel will hopefully have read and understood the instructions or successfully used the lowered Transceiver to communicate with the helicopter.

IMPORTANT:

The importance of establishing clear communications with the vessel in distress cannot be overstated.

PRE-DISPATCH:

Remove the Red protective cover and check the general condition of the life raft.

Connect the 100 mm carbine hook on the Delivery Line Bag to the webbing anchor loop on the front of the raft valise. (Line with Red Tag "Connect to Life Raft Webbing).

Connect the Life raft Activation Line 80mm carbine hook to a suitable aircraft hard point on the side of the raft away from yourself.

NOTE:

This hard point should be in a position to allow unobstructed dispatch from the aircraft.

It is important to make sure that the Life raft, Delivery Line Bag, all the various cordage and rope are clear of personnel and anything else that could impede a clean life raft dispatch.

Attach the Delivery Line Bag to a rear life raft valise handle via the supplied 100mm Snap Hook on the back of the bag.

NOTE:

Attaching to the rear life raft handle will ensure that the Delivery Line Bag sits at the front of the raft and stays in the aircraft, with the life raft during Delivery Bag deployment and will be safely deployed along with the life raft.

Finally, **attach** the Delivery Bag draw cord to the 100mm Formed Eye Snap Hook on the end of the Buoyant Rope.

CAUTION:

The Delivery Bag is heavy (8kg), with all three weights fitted.

After a final check of the cabin area, the Aircrew Officer can inform the pilot that they are ready to lower the Helicopter Delivery Bag

Prior to arrival over the vessel, it may be a consideration to begin lowering the Helicopter Delivery Bag. This will ensure that the survivors can see that the helicopter is lowering an object and can prepare to receive it.

CAUTION:

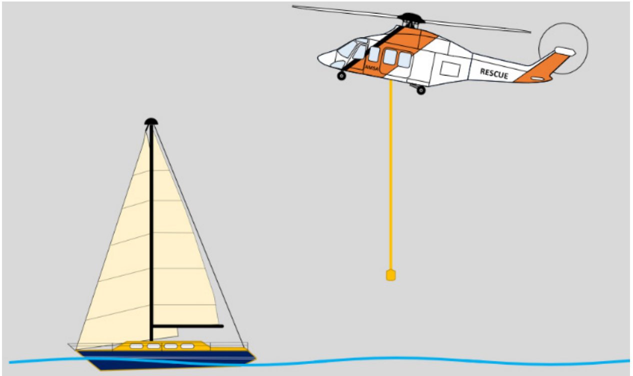
Due to the possibility of the delivery bag becoming entangled on the vessel and causing a premature deployment, the raft and delivery line bag must be at the doorway, clear of all obstacles ready to be deployed before the delivery bag is lowered

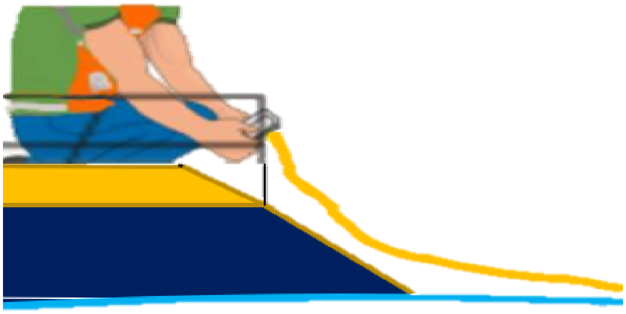
VESSEL DISPATCH:

The Helicopter Delivery Bag is lowered to the vessel, with a minimum amount of excess rope on the deck with due regard to sea conditions.

NOTE:

A winch glove should be worn, as the Delivery Bag is heavy

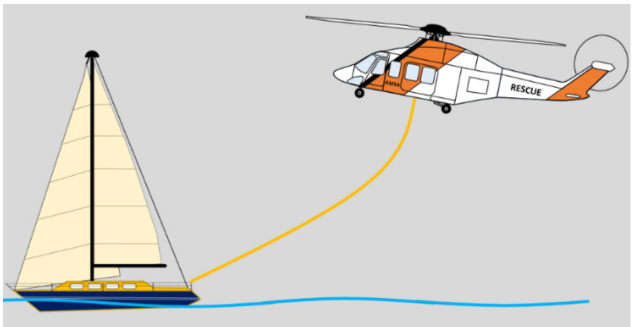




The survivors will remove the Helicopter Delivery Bag and attach the end of the buoyant rope to a suitable strong point on the vessel.

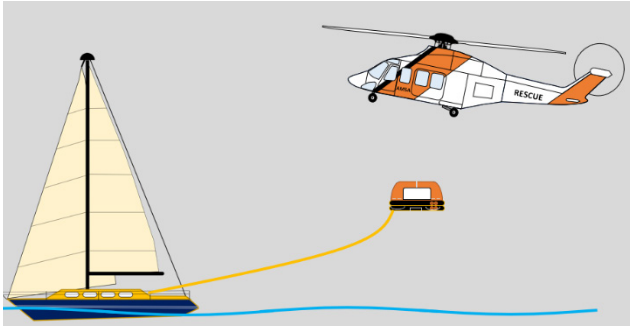
Once the Aircrew Officer can positively see that the buoyant rope is connected to a strong point on the vessel, the helicopter can be moved back to a position where the life raft can be safely deployed.

NOTE:
*The helicopter **must** move back and to the left, or angle itself away from the vessel, to avoid any risk of the delivery line or raft fouling on the aircraft skids during deployment.*



NOTE:
The red sleave indicates that only 30m of buoyant rope remains in the Delivery Line bag. The life raft should be deployed ASAP.

IMPORTANT:
The Aircrew Officer is to always have positive control of the raft and delivery line bag.



It is preferable to drop the raft as close as possible to the vessel although it can be dropped up to 71m from the vessel.

The Helicopter Delivery Line Bag is dispatched along with the life raft.

CAUTION:
Due to the pitch and roll of the vessel, there exists a possibility that the life raft could be forcibly pulled from the helicopter following a successful attachment to the vessel.

If the Aircrew Officer feels a pull, the life raft and delivery line bag are to be allowed to cleanly exit the cabin.

The Aircrew Officer will advise the pilot ***"RAFT GONE"***.

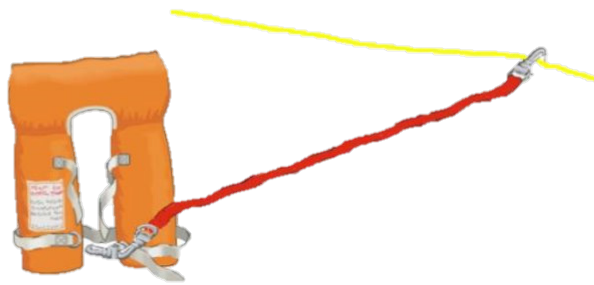
The life raft will start to inflate very soon after deployment. The weak link will break approximately halfway down its length. The carbine hook and a small length of Weak Link will remain attached to the aircraft hard-point.

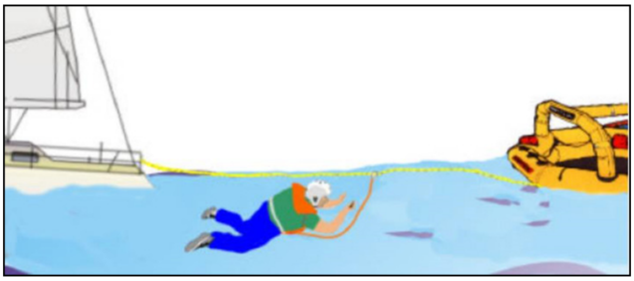
SUVIVOR TRANSFER

The survivors can attach the safety lines contained in the Helicopter Delivery Bag to their life vests, a belt, or another suitable attachment point on their clothing or equipment.

If no suitable attachment point exists, the safety lines can be secured under the survivor's arms.

The other end of the safety line is attached to the buoyant rope.





The survivors should enter the water one at a time to overcome tangling on the buoyant rope.

One survivor should supervise all other survivors evacuating the vessel.

The last survivor off the vessel should ensure that the vessel will remain afloat for the duration of the rescue operation. If there is a possibility that the vessel might sink before all crew are retrieved from the life raft, the last survivor off should detach the buoyant rope from the vessel's strongpoint and attach themselves to the buoyant rope via the snap hook or tie themselves off on the buoyant rope and swim to the raft. This clears the vessel to sink without pulling the life raft down with it.

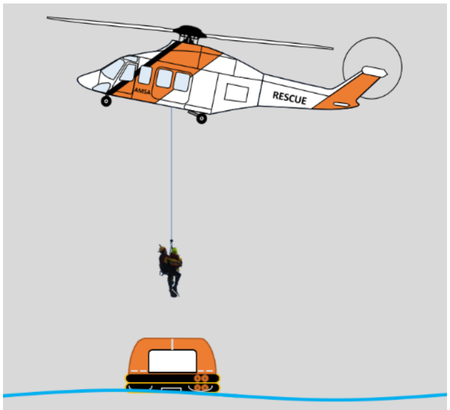
IMPORTANT:
The crew of the rescue helicopter should inform the survivors to disconnect their safety lines after entering the life raft

A safety knife is supplied in the Delivery Bag and another knife is included with the life raft for emergency life raft cutaways. Survivors should disconnect their safety lines from their life vest or belt after entering the life raft to allow for clean winching from the raft. Survivors may choose to pull the raft closer to the vessel to board it, rather than swimming to the raft using the safety lines.

However, it is important to note that survivors may not always be physically able to reach the deployed life raft. In such cases, a Rescue Crew Officer may need to be lowered into the raft to pull it to the vessel and assist the survivors. Therefore, it is crucial that the Aircrew Officer positions the raft appropriately, and the survivors' physical condition should be assessed beforehand.

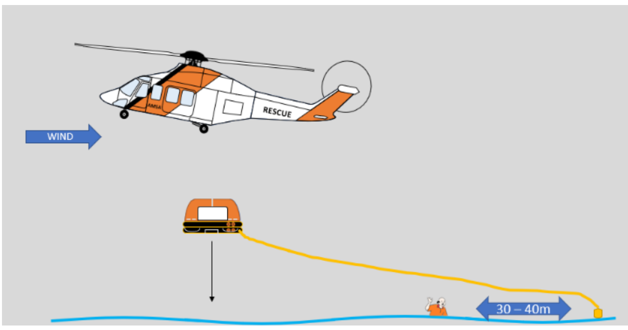
Once all survivors are safely inside the life raft and it is safe to do so, the helicopter can either winch down a Rescue Crew Officer/Paramedic to assist or begin winching survivors directly from the life raft.

The Rescue Crew Officer/Paramedic must ensure that all safety lines are disconnected from the survivors before attempting to lift them out of the life raft.



SURVIVORS IN THE WATER

For survivors in the water, the raft deployment technique is different. The helicopter should approach the survivors into the wind and begin lowering the Delivery Bag (with the weights removed to prevent it from sinking) 30 to 40 meters before passing directly overhead the survivors. Once upwind of the survivors, the life raft can be deployed. The survivors should be able to grasp the buoyant rope and proceed to the deployed life raft.



NOTE:
Survivors will not be expected to utilise the safety lines during this deployment procedure.

NIGHT RAFT DISPATCH

This procedure is specific to raft configuration only; operators must develop and implement their own company-specific procedures for low-level night dispatch.

Clean Raft Deployment

This process allows for the raft to be deployed clean without the use of the Helicopter Delivery line

Remove the Red protective cover and check the general condition of the life raft.

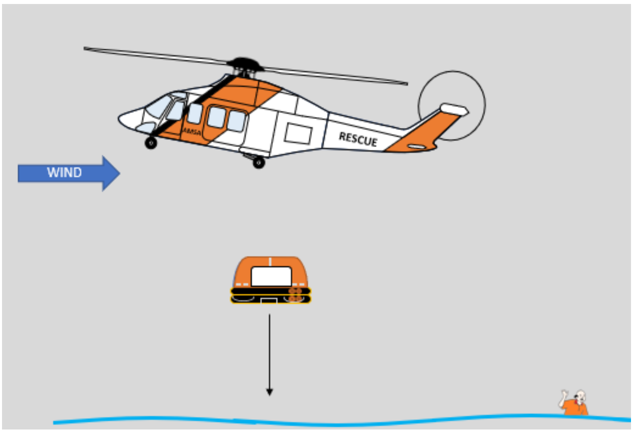
Connect the Life raft Activation Line 80mm carbine hook to a suitable aircraft hard point on the side of the raft away from yourself.

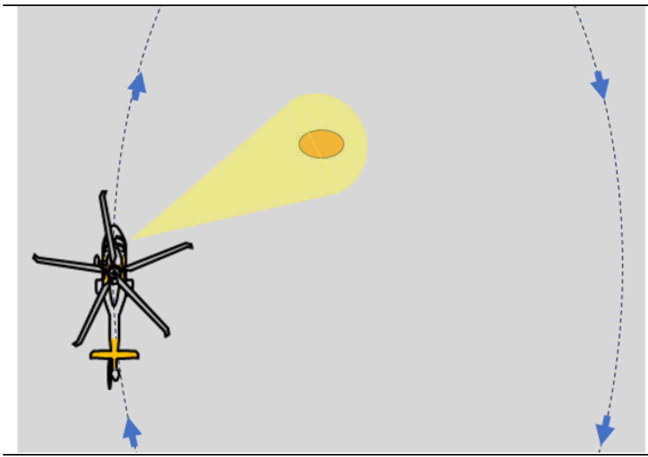
NOTE:
This hard point should be in a position to allow unobstructed dispatch from the aircraft.

Deploy the Raft.

To ensuring you clear the aircraft skids / wheels a forcefull push of the raft is required.

NOTE:
Considerations should be made to deploy the raft up wind / up current of the survivors in the water





Provide illumination of the scene.

Where safe and practical, continuous illumination of the scene should be provided. This can be achieved using the searchlight or crew-steerable lighting to assist survivors in identifying the raft and making their way towards it.

This section details the approved method for configuring a life raft for night dispatch. It is important to emphasize that this procedure addresses raft configuration only and does not include low-level night dispatch operations.

Operators are responsible for developing and documenting detailed, company-specific procedures for low-level night raft dispatch in their Expositions or Operations Manuals. These procedures must be tailored to the operator’s specific aircraft, equipment, and operational context.

Furthermore, all aircrew involved in night dispatch operations must be adequately trained and assessed as competent in their organization’s procedures.

All operator procedures must comply with CASA regulations and any other applicable requirements for night operations, maintaining the highest standards of safety and compliance.

NOTE

The overriding principle is that the safety of the aircraft and crew must not be compromised at any stage.

TESTING & MAINTENANCE

PREFLIGHT:

- Remove the red protective cover and check the general condition of the life raft.
- Inspect the webbing loop at the front of the valise.
- Inspect the life raft activation system:
  - Cotton safety tie
  - Connection cord and activation cable
  - Life raft activation line
  - Weak link assembly

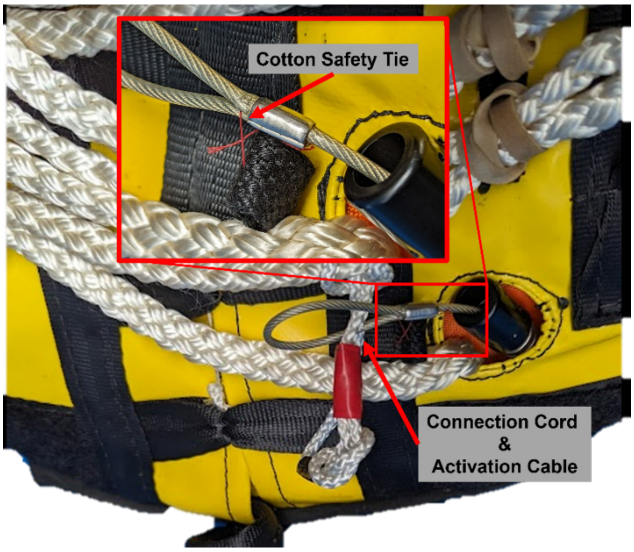
Cotton Safety Tie:

The operating head wire lanyard is secured to the becket on the life raft valise by a 3 lb cotton safety tie to prevent inadvertent operation. The safety tie must be in place.

Connection Cord and Activation Cable

The Connection Cord (No 20 Venetian Blind Cord) is secured with a Prussic Loop onto the Activation Line and then looped through the Activation Cable, thereby connecting the Life Raft Activation Line to the Life Raft Activation Cable.

During the raft pre-flight, check that this Prussic Loop is in place.



Life raft Activation Line

Inspect and re-stow any remaining activation line under the elastic loops. It is important that the activation line is secured correctly to ensure the proper deployment of the equipment.

Weak link assembly

The last 30 cm of the Raft Activation Line consists of a 65 kg Weak Link ending in an 80 mm carbine hook. This Weak Link assembly is designed to ensure that the life raft CO_2 cylinder will activate before the line breaks away from the aircraft hard point.

4.5 SAR Communications Equipment

4.5.1 Helicopter Lightweight Delivery Line Kit

The Helicopter Lightweight Delivery Line Kit (HLDLK) is designed to lower a radio transceiver or other communications device to a vessel without communications or to a survivor on the ground for initial communication to ascertain the situation.

USE:

The Helicopter Delivery Line Kit is used to deliver communications stores to a survivor or vessel where no or limited communications are available. It is often utilized prior to a life raft delivery to enable briefing on the life raft procedure.

RWR SRUs are supplied with a Training Radio Delivery Line Bag, clearly annotated “TRAINING.”

CONSTRUCTION:

The HLDLK is made up of three parts:

- **Radio Bag:** Holds either a standard radio transceiver or another suitable communications device. It is weighted to reduce swaying and assist in penetrating foliage during a land drop.
- **Radio Delivery Line Bag:** Contains 67 meters of 6mm Kernmantle Water Rescue Throw Rope. This rope features a reflective fleck woven through it to increase visibility at night when illuminated.
- **Communications Device:** Consists of a radio transceiver or another suitable communications device.

OPERATION:

- **Prepare the appropriate communications device:**
  - Switch the device on.
  - Ensure the correct channel/frequency is tuned.
  - Lock the keypad (if possible).
  - Test the communications device, both transmit and receive.
  - Turn the volume to maximum.
  - Leave the communications device on.
- **Prepare the Radio Bag:**
  - Place the communications device inside the Radio Bag.
  - Seal the Velcro pouch.
- **Prepare the Radio Delivery Line Bag:**
  - Secure the Radio Delivery Line Bag to an appropriate attachment point on the cabin floor using the provided 60mm snap hook.

IMPORTANT:

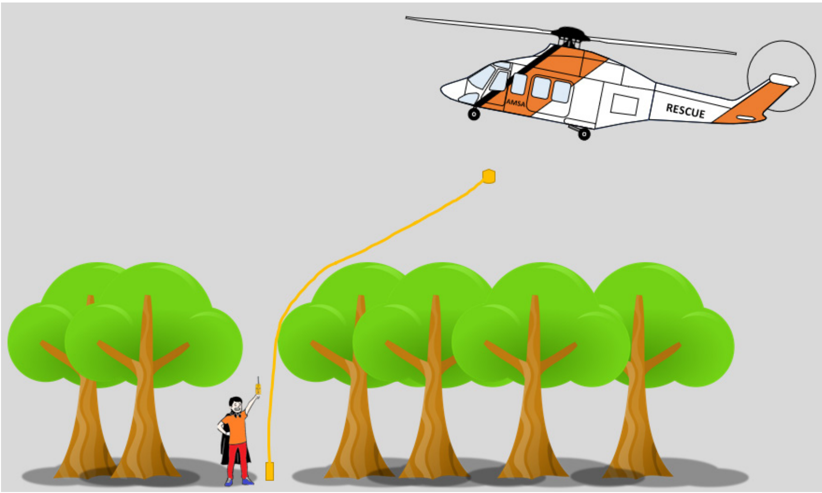
Note 1: *Ensure there is a weak link in place between the Radio Delivery Line Bag and the snap hook.*

Note 2: *It is important that the positioning of the Radio Delivery Line Bag on the cabin floor allows it to break away safely and cleanly exit the aircraft in the event of fouling.*

Note 3: *Additional weights to provide stability (if required) can be attached to the loop on the rear of the bag or placed inside the case.*

After a final check of the cabin area, the Aircrew Officer can inform the pilot that they are ready to lower the Radio Bag.

- **Deliver the Radio Bag:**
  - Whilst wearing a winch glove, use the hand-over-hand method to lower the Radio Bag to the vessel or survivor.
  - Prior to arriving over the vessel, consider beginning to lower the Radio Bag. This will ensure that the survivors can see the helicopter lowering an object and can prepare to receive it.
- **Dispatch Delivery Line Bag:**
  - Once the crew or survivor has received the Communications Device, the Aircrew Officer can detach the Radio Delivery Line Bag from the cabin floor hard point and throw it clear of the aircraft.
- **Communicate with the Crew or Survivor:**
  - Using the preselected channel or frequency, you can now communicate with the survivor.
  - Due to the noise of the aircraft, the crew may need to consider moving away from the area slightly to enable clear communication.



NOTE:

The helicopter must move back and to the left, or angle itself away from the dispatch area, to avoid any risk of the Delivery Line fouling on the aircraft skids during deployment.

Testing & Maintenance:

Pre-flight:

- Uncoil all buoyant rope and repack it to ensure smooth deployment from the Delivery Line Bag without knots.
- Inspect the weak link. Ensure the weak link is in place between the Delivery Bag and the snap hook and is tied as per Type 1.

Post Training:

- All training equipment must be properly cleaned with fresh water to remove contaminants such as salt, dirt, and mud.
- Hang the equipment in a cool, shady place to dry.
- Check for damage or wear.
- Repack the equipment correctly.
- Replace the weak link.

4.5.2 Message Bag

The Air Drop Message Bag is a specialized container designed for delivering important messages or supplies from aircraft to ground or sea-based recipients. It is typically made from durable and waterproof materials to protect its contents during the airdrop process and adverse weather conditions.

USE:

The Message Bag is suitable for being dropped from rotary-wing aircraft to survivors who are unable to communicate by radio or other means.

CONSTRUCTION:

The Message Bag consists of a durable envelope containing two (2) cards with both air-to-ground and ground-to-air signals. These signals can be used by survivors to signal or to understand reply signals from the search aircraft.

The Message Bag is weighted and the two (2) attached streamers make it easy for the survivors to see the bag on its fall from the aircraft.

> **NOTE:**
>
> *Message Bags are weighted; therefore, consideration needs to be taken when used in the maritime environment.*

OPERATION:

- The Message Bag tails should be folded over concertina style, and the bag should be rolled up around the folded tails.
- The Message Bag must be dispatched clear of the aircraft in a positive downward motion.

TESTING & MAINTENANCE

- Check General Condition of Item.

4.5.3 Search and Rescue Communicator (SARCOM)

The SALCOM™ Search and Rescue Communicator (SARCOM) is a low cost, simple to use, immersible emergency AM radio operating on the aviation band of 123.1 MHz

USE:

The unit provides communication from aircraft to personnel in distress where they cannot be reached, and no alternative communication method exists.

CONSTRUCTION:

The unit is made of yellow plastic and is rugged, fully sealed, and capable of withstanding water immersion, making it ideal for use in marine distress situations.

Each SARCOM is supplied with a hard-fronted pouch for safe storage and protection from accidental operation of the push button.

OPERATION:

- Release the retaining strap on the pouch.
- Remove the radio from the pouch by pulling on the aerial.
- Turn on the radio by pressing the ON button.
  - A green light on the front panel will indicate that the SARCOM is operating.
- To transmit, press the Press to Talk button and speak into the area labelled SPEAK HERE on the front panel.
  - The light on the front panel will change to red while transmitting.
- To turn off the radio, press the OFF button.

> **NOTE:**
>
> There are no external Volume or Squelch controls.

TESTING & MAINTENANCE

PRE-FLIGHT

- Prior to use, the crew must perform a functional check on the radio, including testing both the transmitting and receiving functions.
- The operational SARCOM runs on a factory-changeable 9V battery, has a shelf life of five years, and an endurance of approximately fifty hours when activated.
- The training SARCOM features a replaceable 9V battery, which can be replaced by unit personnel. The training SARCOM is identified by a red-coloured pouch.

SARCOM radios will be retired from service over the coming years as current stocks deplete.

4.5.4 Transceiver Marine band VHF - Icom M85E

The Icom M85E is a compact, lightweight marine-band VHF handheld transceiver, manufactured by Icom Inc.

USE:

The unit is primarily used for communication either between a search aircraft and vessel in distress, recovery vessel whilst involved in drop training or vessel-to-vessel.

CONSTRUCTION:

The ICOM M85E is constructed of a durable black plastic casing. The radio itself is constructed to IP67 and MIL-STD specifications meaning the radio is tested for submersion in water up to 1m for 30minutes.

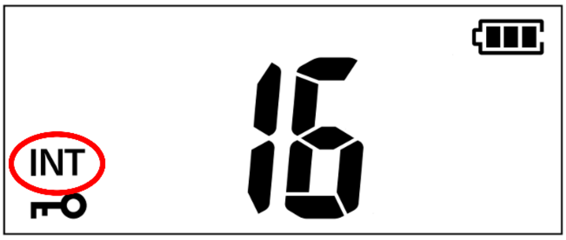
The Icom M85E transceiver's Lithium Battery Pack has been removed and replaced with the optional AA Battery Pack (BP-291). This battery is rated to a lesser IP54 specification tested for water resistance to water splashed on the unit.

OPERATION:

- Rotate the Volume/Power Knob clockwise to switch on.
- Adjust the volume by turning the Volume/Power Knob.
- Use the Tuning Dial to cycle between marine radio channels.
- Press the Push-to-Talk button when transmitting.
- To switch off, turn the Volume/Power Knob counterclockwise until it clicks.

TESTING & MAINTENANCE:

- Undertake a full function test:
  - Power on.
  - Transmit.
  - Receive.
- Ensure the radio is on the international channel group:
  - Press and hold down CH for 1 second to change the channel group.



- Replace batteries as required.
- The radio unit can operate on high, medium, and low output settings. Operators should select the appropriate setting for the environment, usually HI for the operational SAR arena.

4.5.5 Aviation VHF Band Transceiver - Icom IC-A25NE

The Icom A25NE is a waterproof 6W VHF air band handheld transceiver manufactured by Icom. This guide covers only the basic operations of this complex radio.

USE:

The A25NE has two main uses:

- Aid to Beacon Homing's.
  - Used by the SRU crew to assist in conducting ground direction finding (DF).
- Communications
  - Facilitates communication between search aircraft and persons in distress, recovery crew during drop training, or for ground-to-air communications.

CONSTRUCTION:

The Icom A25NE is constructed with a durable black plastic casing and is built to IP57 and MIL-STD specifications, allowing it to be submerged in water up to 1 meter for 30 minutes.

The transceiver uses an AA Battery Pack (BP-289), which is rated to IP54 standards, meaning it is tested for resistance to water splashed on the unit.

OPERATION:

- Press & hold the power button to turn on.
- Adjust the Volume by turning the Volume control knob.
- Change Desired Frequency:
  - Keypad:
    - Press CLR.
    - Use the keypad numbers to type in the desired frequency.
  - Using Dial:
    - Press F and rotate the dial to set the MHz digit.
    - Within 3 seconds, press F again and rotate the dial to set the kHz digit.
- Press the Push to Talk button when transmitting.
- Press and hold the power button to switch off.

TESTING:

Before each flight, the unit is to be inspected for any signs of damage, and batteries replaced as necessary.

4.6 SAR Target Markers

It is essential that once survivors have been located, some form of marker be used to ensure they can be readily relocated. Five types of SAR markers are currently available for daylight operations: Self-Locating Datum Marker Buoys, smoke markers, and Marine Dye Markers.

A strobe marker should be used at night, during approaching last light, or in poor visibility.

Self-Locating Datum Marker Buoys are suitable for both night and day operations.

MARKER	ADVANTAGES	DISADVANTAGES
Smoke Markers	• Highly visible • Easy operation	• Smoke quickly disperses in winds greater than 20–30 kts • Toxic smoke • Possibility of fire if fuel is on surface of water • Limited Duration (Minutes)
Marine Dye Marker	• Easy operation • Highly visible in light seas	• Dissipates rapidly in rough seas
Self-Locating Datum Marker Buoy	• Easy operation • Non dangerous • Long operational duration	• Large item • More complex to deploy
Droppable Strobe	• Easy Operation • Visible at Night • Non-dangerous	• 4 - 5 hours duration only

IMPORTANT:

Caution must be exercised with respect to dropping any pyrotechnic markers into water possibly contaminated with fuel

4.6.1 Self-Locating Datum Marker Buoy

The Fastwave Voyager V3 is a specialized Self-Locating Datum Marker Buoy (SLDMB) designed for use in marine environments. It provides near real-time data on ocean current movement and sea surface temperature. The Fastwave's fin design and low freeboard ensure minimal wind influence once it is in the water.

USE:

SLDMBs are primarily used to validate net water movement and SARMAP drift modelling. They are dispatched upon request from the ARC. Typically, SLDMBs are dropped at the last known position of the target or at the best estimate of the target's current position based on drift modelling or incident intelligence. The ARC may request additional SLDMBs to gain an overview of general water movement in the target probability area. SLDMBs also provide data for survivability planning.

Fastwave Voyagers transmit position, sea surface temperature, and battery voltage every 10 minutes for the first 12 hours, then every 30 minutes thereafter. They are contracted to meet a minimum of 21 days of transmissions but can transmit for up to 300 days at 3-hourly intervals.

> Do not test unit prior to deployment.

CONSTRUCTION:

Fastwave Voyager V3 consists of 4 main components

Storage Box:

A protective box is used for storing the Fastwave Voyager V3 buoy. The unit must remain within the case during all transport, storage, and on-board aircraft storage until deployment.

Fastwave Buoy:

Fastwave Voyager V3 Buoy

Strobe Light:

The strobe light is part of the Fastwave buoy but operates independently. Its status does not affect the buoy's dispatchability. The strobe light is controlled separately from the buoy and has its own power source.

Lycra Parachute Sock & Static Line:

This is used to secure the parachute to the top of the Fastwave buoy during storage and deployment. Upon deployment, the Lycra sock separates from the buoy, allowing the parachute to deploy. The Lycra sock remains attached to the static line.

OPERATION:

ROTARY WING DEPLOYMENT PARAMETERS

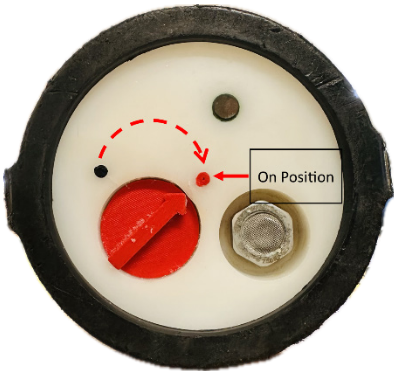
The Helicopter should be flying over the target area in the following configuration:

Flight Configuration	Deployment Speed	Deployment Altitude	Minimum Water Depth
Forward Flight	60KIAS	100ft – 1000ft	3m
In the Hover	0KIAS	50ft – 1000ft	3m

WARNING:

The SLDMB is to be deployed in VMC conditions only - Not through cloud.

RAPID DEPLOYMENT PROCEDURE:



- Remove the buoy from the box or carry case.
- Note the four-digit serial number on the fin.
- Turn the RED switch on the bottom of the base cap CLOCKWISE to the RED marking, which is the “On” position
- Turn on the Strobe through the Lycra sock.
  - Under the black Lycra sock is the strobe; turn clockwise and wait for the flash.
- Look at the base of the unit for the RED LED that will remain on (It will not always be visible in direct sunlight), with 1 x long matching vibration, while the unit is powering up.
- Attach one end of the static line to a secure anchor point inside the aircraft. Adjust the length of the static line to suit the aircraft.
  - Lay out the line inside the aircraft so it cannot tangle when the buoy is deployed.
- Conduct Strike Zone Clearance Procedure.
  - (Appendix A - FASTWAVE DAY VMC / NIGHT VMC DROP PATTERN).
- Once the unit is powered-up and has vibrated to indicate it is on, it can be deployed immediately.
- Eject the buoy from the aircraft, with the unit remaining upright.
- Retrieve the static line.

IF TIME PERMITS:

- Place the drifter buoy in an upright position in the Carry Case or Box with a clear view of the sky.
- Check for the following status alerts:
  - Successful GPS lock: 3 x short vibration bursts and the RED LED flashing 3 times simultaneously.
  - Successful transmission: 2 x short vibration bursts and the RED LED flashing 2 times simultaneously.
- This means the unit is 100% functional and ready for deployment.

NOTE:

Prior to deployment crews must ensure the intended strike zone for the deployment of the SLDMB is clear of all vessels, persons, shallow water or land.

See Appendix A - FASTWAVE DAY VMC / NIGHT VMC DROP PATTERN

ABORTED DEPLOYMENT

- If the unit is not required after switching on, simply turn the switch back to the black dot.
- Turn off strobe:
  - Turn strobe though Lycra sock Counterclockwise.

POST DEPLOYMENT:

After Fastwave Buoy deployment, the ARC requires confirmation of the following information:

- Four-digit Fastwave Buoy Serial number.
- Drop point (latitude and longitude).
- Launch time (UTC).
- Altitude and wind speed.
- Confirmation of sighting of the Buoy on the surface (if possible).

NIGHT DEPLOYMENT

Night SLDMB dropping operations are subject to stringent and specific approvals; however, some basic general principles to be maintained regardless of any approvals/exemptions:

- Individual SRU Operations manuals will specify exact crew composition.
- The strike zone must be positively checked by aircraft FLIR system, NVGs, and/or visually by crew using illuminating flares or Night Sun (if fitted) before the dropping operation to ensure there are no vessels, persons, or land masses visible.
- The SLDMB will be dropped from overhead the drop point while tracking downwind to ensure the buoy lands inside the cleared strike zone.

NOTE:

Should proximity to terrain or other issues affect drop pattern viability careful considerations need to be made of the effective and safe delivery of the SLDMB.

IMPORTANT:

Operators must have clear and detailed procedures outlined in their Expositions/Operations Manuals for night deployments before conducting any stores dispatch at night.

4.6.2 Buoyant Orange Smoke Marker (Life smoke Mk 9)

The Pains Wessex Life smoke Mk 9 is a small and compact distress signal designed for daylight use. It produces a dense orange smoke for a minimum of 3 minutes.

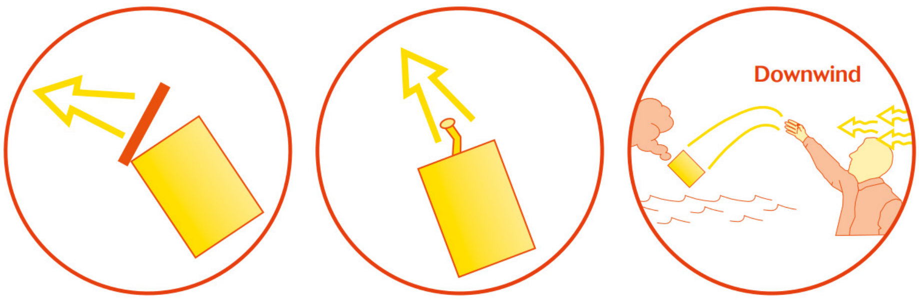
USE:

The Life smoke Mk9 has two primary uses in the SAR environment:

- **Position Marking During SAR Operations:**
  - Used to mark the locations of survivors or objects of interest in the water to facilitate repositioning for further investigation.
  - Provides crews with reference points or timing markers.
- **Wind Direction Indications:**
  - Can be used to identify wind direction on the surface of the water.

OPERATION:

- Remove the top plastic transit cap.
- Grasp the red tab firmly.
- While holding firmly onto the red tab, pull the unit away from the body and throw it overboard (away from the aircraft).
- The unit should begin to produce smoke within two to three seconds.



TESTING:

PREFLIGHT

Ensure Life smoke MK9s are within service life, noting the expiry on the outside of the canister.

IMPORTANT:

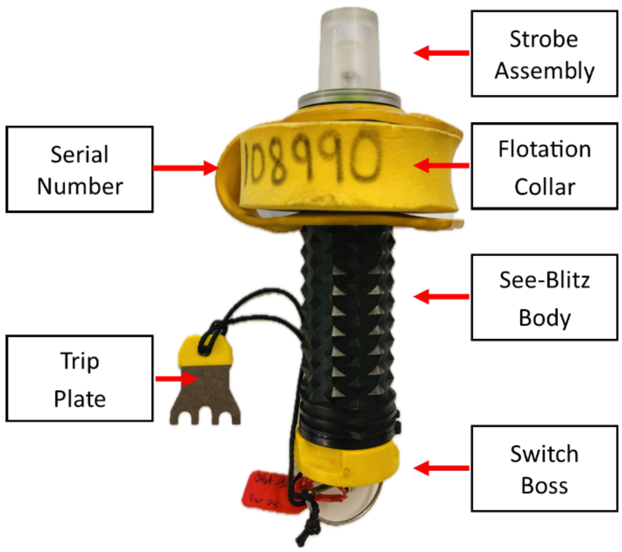
Marine pyrotechnic markers (MK 9) are not to be dropped on land due to the possibility of causing fire and EOD hazards.

4.6.3 See-Blitz – Strobe Marker

The See-Blitz is a white strobe marker that emits a powerful white flash every two (2) to three (3) seconds. It is waterproof up to 450 meters and has a range of up to 16 kilometres in the open. The See-Blitz is also safe for use in explosive and hazardous locations, being explosion-protected and approved for Ex s II Zones 1 & 2.

USE:

The See-Blitz is primarily used for position marking during SAR operations in periods of low visibility, night operations, or when directed by the ARC. It can be dropped or lowered in both land and marine environments.



CONSTRUCTION:

The See-Blitz is constructed of NBC warfare-proof PBT, making it extremely durable and waterproof.

It is normally powered by four (4) AA-cell batteries, but in an emergency, it can be powered by just one AA-cell battery.

The See-Blitz must have the flotation collar properly fitted prior to dispatch over water

OPERATION:

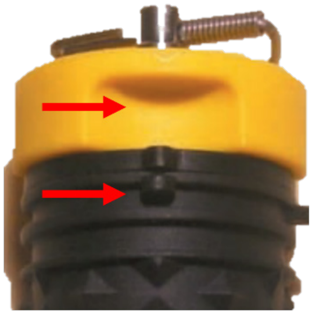
NORMAL OPERATION – TURN ON

Pull back the yellow switch boss.

Turn in either direction until the detent pin falls into the "on" position.

The See-Blitz is activated when the raised round ridge of the yellow switch boss aligns with the round marker on the case lip.

NORMAL OPERATION – TURN OFF

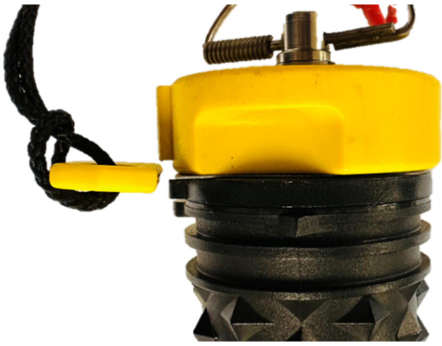


Pull back the yellow switch boss.

Turn in either direction until the detent pin falls into the "off" position.

The See-Blitz is deactivated when the raised round ridge of the yellow switch boss is not aligned with any marker on the case lip.

TRIP ACTIVATION



Turn the See-Blitz to the normal "on" position.

Slide the trip plate under the "on" marker between the yellow boss and the See-Blitz.

Engage the slotted edge of the trip plate firmly against the pivot and detent pins; when correctly in position, the See-Blitz will shut down.

Removal of the trip plate will turn the See-Blitz on.

NOTE:
For night operation, the metal trip plate must be inserted between the yellow switch boss and the handle prior to arming. The trip plate is removed just before dispatch. The strobe will activate after dispatch, well clear of the aircraft and thus not interfere with the crew's night vision.

TESTING:

PRE FLIGHT.

- Complete full function test of the See-Blitz.

4.6.4 Fluorescent Marine Dye Marker (Seamark)

Marine Dye Marker is a solution of a UV activated chemical compound (fluorescein) that, when immersed in water, gives the water a bright green coloration that makes it stand out from the natural sea colour.

CONSTRUCTION:

Sea Marker Dye comes in a powder form that is highly soluble in water. The dye is non-toxic, biodegradable, and environmentally friendly.

USE:

The Sea Dye Marker is primarily use for position marking during SAR operations,

- Used to mark the locations of survivors or objects of interest in the water to allow repositioning for a more suitable investigation.
- Provide crews with reference points or timings markers.

OPERATION:

- Tear along the perforated edges of the dye packet.
  - A small tear of one corner will provide a narrow streak in the water, which assists in establishing the drift of the current, while a large tear will produce a larger round stain in the water.
- Forcibly throw the sea dye down and away from the aircraft.
- Marine Dye Marker can taped to the side of the Mk 9 smoke although they can also be dropped individually.

> **CAUTION:**
>
> Marine dye marker presents negligible hazard to the user.
>
> If the dye is removed from its sealed pack and comes into contact with a person or equipment it will take on moisture and will stain - avoid getting on hands or in eyes.

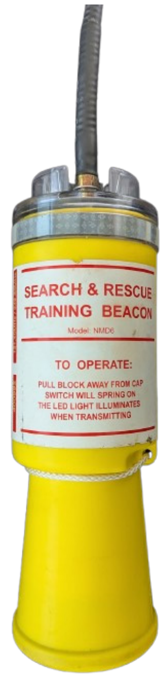
TESTING:

PRE-FLIGHT

- Ensure the packing is in good condition and free from tears.
- Check item is within expiry date.

4.7 Additional AMSA Supplied SAR Equipment

4.7.1 SAR Training Beacon – 121.4 MHz



The Kinetic SAR Training Beacon is a search and rescue training beacon that has almost all the characteristics of an EPIRB. The beacon operates on training frequencies of 121.40 MHz and 242.8 MHz

USE:

The Kinetic SAR Training Beacon is normally used to enhance aircrews' homing location skills during search and rescue training exercises. The training exercise simulates the location of electronic distress beacons, such as EPIRBs.

CONSTRUCTION:

The beacon is constructed the same as the Kinetic SAR Datum buoy, with a yellow-coloured housing. The label consists of red text on a white background.

The dimensions are 80 mm in diameter and 250 mm high, excluding the aerial. The unit weighs about 1 kg.

The Training Beacon operates on 121.40 / 242.80 MHz

OPERATION:

- Unscrew the top of the training beacon utilising the provided C-Spanner.
- Connect Battery power pack to the circuit board on the top of the beacon.
- Replace the top of the training beacon.
- Remove switch guard.
- Switch On.
- RED LED will illuminate.

The ARC maintains radio watches for transmissions from SAR Training Beacons. Care must be taken to ensure that the unit is only switched on for the time required to carry out training or audits.

IMPORTANT:

When using the SAR Training Beacon for training, the ARC is to be advised on 1800 815 257 advising of the nature and location of the training and the duration.

The ARC is also to be called at the conclusion of any training exercise.

4.7.2 SAR Training Beacon – 406 MHz (Kinetic)

The Kinetic SAR Training Beacon is a search and rescue training beacon that has almost all the characteristics of an EPIRB. The Beacon operates on training frequencies of 121.40 MHz, and 406 MHz

USE:

The Kinetic SAR Training Beacon is normally used to enhance aircrews' homing location skills during search and rescue training exercises. The training exercise simulates the location of electronic distress beacons, such as EPIRBs.

CONSTRUCTION:

The beacon is constructed the same as the Kinetic SAR Training Beacon, with a yellow-coloured housing. The label consists of black text on a white background. The dimensions are 80mm diameter and 250mm high excluding aerial, weighting about 1kg.

The Training Beacon operates on 121.40 / 406.25 MHz

OPERATION:

- Unscrew the top of the training beacon utilising the provided C-Spanner.
- Connect Battery power pack to the circuit board on the top of the beacon.
- If only using 121.4 MHz signal for training turn the internal toggle to VHF only.
- Replace the top of the training beacon.
- **<u>Ensure beacon has a clear view of the Sky to initialise.</u>**
- Turn switch guard.
- White Strobe will a will flash & Audible Beep will sound
- **<u>It may take up to 2 Minutes once switched on to transmit on 121.4MHz</u>**

The ARC maintains radio watches for transmissions from SAR Training Beacons. Care must be taken to ensure that the unit is only switched on for the time required to carry out training or audits.

> **IMPORTANT:**
>
> When using the SAR Training Beacon for training, the ARC is to be advised on <u>1800 815 257</u> advising of the nature and location of the training and the duration.
>
> The ARC is also to be called at the conclusion of any training exercise.

4.8 Night Supply Drop Operations

Night supply drop operations are only permitted by helicopters that have specific CASA approvals.

Night dropping operations are subject to stringent and specific approvals, however, some basic general principles to be maintained regardless of any approvals / exemptions:

Individual SRU Operations manuals will specify exact crew composition.

The strike zone must remain visible to the aircraft (Use FLIR system if fitted) during the dropping operation.

The deployed load must remain visible, by means of lighting, to the survivors.

The aircraft crew must be able to predict the probable landing position of the deployed load in the circumstances.

Load will be dropped from overhead the target whilst tracking down-wind so as guarantee clearing persons and property from the dropped load

IMPORTANT

Operators must have clear and detailed procedures outlined in their Expositions/Operations Manuals for night deployments before conducting any stores dispatch at night.

APPENDICES VOLUME 4

Appendix H – SLDMB Day VMC / Night VMC Drop Pattern

ROTARY WING
SLDMB DAY VMC / NIGHT VMC DROP

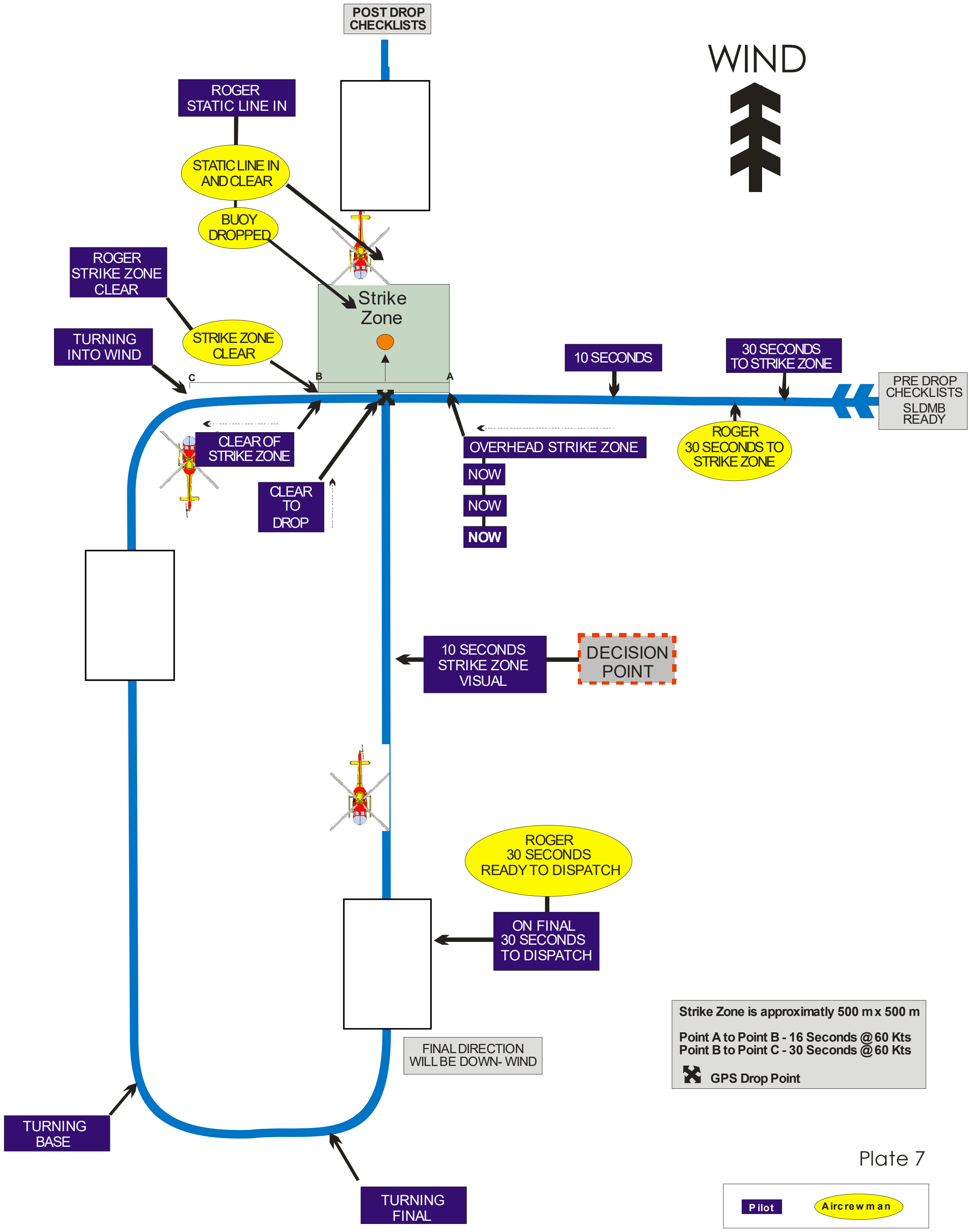


Plate 7

Appendix I – AMSA Supplied Equipment

SAR Equipment	Quantity
Box Knocking Hook	1
Box Knocking Ring	1
C Spanner	1
Cabinet Pyrotechnic Storage	1
Directional Finding Equipment Titley RX3	1
Droppable Life Raft System - MKII	1
SLDMB	1
SLDMB Storage Case	1
FP Training Log	2
Helicopter Delivery Line Kit	1
Training - Helicopter Delivery Line Kit	2
Helicopter Lightweight Delivery Kit	1
Training - Helicopter Lightweight Delivery Kit	1
Light Marker Distress - See Blitz	2
Message Bag	4
SAR Training Beacon	1
Transceiver – Airband	1
Transceiver - Marineband	2
Transceiver - SARCOM Airband Droppable	1
Transceiver - SARCOM Droppable Training Unit	1
Transit Case - Pyrotechnics	1
Life Raft Spacecase	1
SAR Consumables	**Quantity**
Cyalume Light Marker	6
AAA Batteries	5
AA Batteries	36
9V Batteries	4
Gaffa Tape	1
Sea Marker Dye (100g Pack)	8
Life Smoke MK9	12

NOTE:

Locations and quantities are subject to change without notice

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Top Cover Operations

5. TOP COVER OPERATIONS

5.1 The Top-Cover Function

Top cover may be provided by the dedicated long-range AMSA search and rescue aircraft for a helicopter or vessel affecting a rescue or MEDEVAC, primarily as a risk mitigation measure, but also to facilitate the rescue or MEDEVAC.

AMSA currently employees a fleet of Challenger 604 aircraft for this purpose. These aircraft have the capability to drop various types of SAR supplies and equipment, and to facilitate communications and alerting for RW rescue assets operating on SAR and MEDEVAC missions at low level. Marine Border Command aircraft can also perform the functions of a Top Cover aircraft although they may not be drop capable. ADF aircraft such as the P-8A Poseidon, among other air mobility command and ISR platforms, are also capable of Top Cover duties and in certain circumstances are drop capable. The ARC will assign the most appropriate and available aircraft for any Top Cover aircraft.

Top cover can be provided at the request of a rescue asset or as decided by the SMC.

The SMC will discuss the requirement for a top cover aircraft with the SRU.

Circumstances that may require the provision of a top cover aircraft may include:

- Helicopter operating over water. This will vary with the type of helicopter involved.
- Helicopter operating at or near the limit of their endurance.
- Helicopter operating in poor or marginal weather conditions.
- Helicopter operating at a rescue scene presenting certain dangers, e.g. night.

Top Cover operations may assist with:

- Communications.
- Improving the situational awareness of the ARC and responding units with on-scene reports.
- Facilitating the rendezvous between the SAR target and responding SAR unit with updated positional information.
- Preparing the SAR target for the rescue/MEDEVAC retrieval.
- Provision of updated weather and surface conditions for the rescue unit; and
- Provision of rapid SAR response capability, including dropping of SAR equipment, in the event of an emergency with the responding units (such as helicopter ditching) or other emergency situation (such as a rescue in difficult circumstances, where vessel crew or survivors may risk a man overboard situation)

5.2 Reporting On-Scene Activity

The Top Cover or escort asset will make regular reports of on scene activity to the ARC and other aircraft involved in the SAR operation. When possible, these reports should be made when the other aircraft are not involved in high workload activities such as hoisting unless made via digital text exchange, as not to distract other assets. Radio communications as detailed in section 2 SAR Communication can be used for this purpose however, other methods may also be appropriate. A general rule is that SAR assets or their escort on their behalf should pass information to the ARC every 30 minutes during a SAR operation or when anything of significance occurs.

In order to enhance situational awareness and to assist in safety and continuity of operations, participating aircraft should report to the top cover asset as follows:

- Entry report (entering the search area).
- Reaching assigned points (waypoints as appropriate).
- Leaving assigned points.
- Commencing operations (search, investigation during search, approach to the surface / hover / ship, difficulties, hoist operations, landing etc.).
- Completing operations, including information regarding results.
- Leaving present or assigned search altitude.
- Reaching new altitude.
- 30 minutes on-scene endurance remaining.
- 10 minutes until completing search.
- Exit report (leaving the search area).

Aircraft De-confliction

For operations outside controlled airspace, de-confliction with other aircraft in the search area is the responsibility of pilots in command as per normal flight operations. Crews must maintain situational awareness of the aircraft operating in adjacent search areas and be aware of aircraft manoeuvring at the end of search legs for subsequent legs or manoeuvring for sightings.

Top cover aircraft may provide operating areas including decks (minimum heights) and ceilings (maximum height) to ensure deconfliction.

5.3 Communications plan

The communication plan will vary dependent on:

- Where the operation is located.
- Capabilities of participating SRUs.
- Capabilities of appointed Top Cover assets.

In order to avoid overload of on scene frequencies, it is important that the SMC and the assigned top cover asset coordinate a sufficient number of radio networks.

The following communication plan is generic and can be changed as the actual SAR mission and task dictates:

AIRBORNE:

- On scene surface to surface and surface to air: Maritime VHF (may be CH16 initially).
- On scene air to air: 123.1 MHz
- On scene hoist operations: Maritime VHF CH 6 or 16.
- ACO/OSC: Maritime VHF working channel.

5.4 Duties and Responsibilities of FW Top-Cover Aircraft

Aircraft tasked for top cover will normally be an SRU aircraft carrying supply drop equipment suitable for the environment. The primary tasks of the top cover aircraft will be to:

- Provide navigation assistance to the helicopter to locate the target.
- Provide communications assistance to the helicopter; and
- Provide immediate assistance by way of supply drop should the helicopter ditch.

The Top Cover aircraft will maintain voice communications with the ARC as required by the nature of the mission, reporting requirements and need for the ARC to exchange information with SAR aircraft and other assets in the search area.

5.5 Vessel Briefing

Generally, a top cover aircraft will arrive on scene prior to the helicopter for a MEDEVAC task. The aircraft will endeavour to brief the vessel on the upcoming operation.

The Top Cover crew will brief the vessel on the following:

- Securing/Removing loose articles.
- Switch off the radar.
- Take wind 30° on Port bow and keep steering during helicopter operations.
- Maintain constant speed of 10-12kts during helicopter operations.
- Move the patient to the winch location prior to arrival.
- Prepare communications for bridge to deck and helicopter.
- Direct available lighting to the pick-up area, not directed at the helicopter.

APPENDICES VOLUME 5

Appendix J **Top Cover Checklist**

Appendix J – Top Cover Checklist.

TOP COVER—Guide / Checklist

Name of Vessel	Freq/Ch
Helicopter Call Sign	Freq/Ch
Briefed Rendezvous Position	Briefed ETA

On Initial Comms with Vessel / AIS Info

Position	
Current Course and Speed	
Wind Direction and Speed on Deck	
Winch / Landing Location on the Ship	
Advise ETA of Helicopter	

Has The Vessel / Deck Been Prepared

Secured and Remove all Loose Articles	
Switch Off Radar	
Take wind 30 on the port bow and keep steering during helicopter operations	
Has the patient been moved to the winch location	
Are communications prepared for Bridge to Deck and Helicopter	
Direct available light to pickup area. (Do not direct at helicopter)	
Follow Instructions of crewman	

On Initial Comms with the Helicopter

ETA to vessel position	
Position of Vessel	
Wind direction and speed on deck	
Winch / Landing location on vessel	
Advise winch conditions (Mast / antenna / obstacles)	
Vessel Current course and speed.	
Intentions once in location	
Any further instructions for the vessel?	

Communications Relay Operations

6. COMMUNICATIONS RELAY OPERATIONS

6.1 The Communications Relay Function

A SAR aircraft may be tasked to undertake a communications relay function due to the limitations imposed by the weather, areas of operation, lack of adequate communications equipment on SAR platforms, or to improve coordination of search activities.

A dedicated communications aircraft should be used when communications are expected to be poor in the search area, such as when:

- HF is the only means of communication.
- The search is of a large scale.
- It is necessary to improve information feedback into the ARC.
- It is necessary to improve information flow to search assets.
- Search aircraft are operating without contact with a ground station; or
- It is the best method of maintaining communications with survivors/ground search units and ground rescue units

6.2 Communications Relay Duties and Responsibilities

The aircraft has good on scene endurance and can remain at an altitude where good communications can be maintained with the SAR or other assets, ATS and/or the ARC. The communications relay function may simply be the passing of voice messages from an asset or target to the ARC (or other authority), the provision of flight following, or more complex information gathering and forwarding to the ARC via voice or data messaging (which may include reports generated by the aircraft's Mission Management System for the reporting asset).

Communications Relay specifies a need to be able to maintain communication with SAR or other assets and a ground station. It may be necessary, on some tasks, to separate these roles to guarantee the integrity of the operation.

The crew performing the communications relay function will enter into, a flight pattern over the search area at a flight level/altitude that enables continuous static free communications, to the extent possible, with both ATS and with other SAR aircraft in search area.

The communications relay crew may facilitate flight following and SAR watch for SAR aircraft by:

- Accepting responsibility for the flight following for a particular aircraft (includes advising ATS).
- Monitoring and recording 30 minute "operations normal" calls.
- Maintaining flight following until the search aircraft leaves the area and is handed off to ATS (ensuring the search aircraft has established communications with ATS or Flight watch); and
- Immediately attempting to establish communications with any aircraft involved in a search that misses an "operations normal" call and, if unsuccessful, advise the ARC who will activate the necessary SAR phase.

During communications relay operations the crew will request strict communication discipline on the operating frequency.

The crew will request all aircraft operating on the operating frequency to maintain radio silence whilst a rescue is in progress and re-establish communications with all SAR craft at the completion of the rescue operation. The crew will also make a similar request to marine vessels on appropriate frequencies.

Aircraft separation into, within, and exiting the search area will remain the responsibility of the PIC of the individual SAR aircraft.

During this communications relay role, the SAR aircraft may be required to descend to conduct an immediate supply drop operation. On these occasions, if the crew are unable to continue the communications function, the responsibility for flight following must be passed to another suitably equipped aircraft where possible, or to ATS.

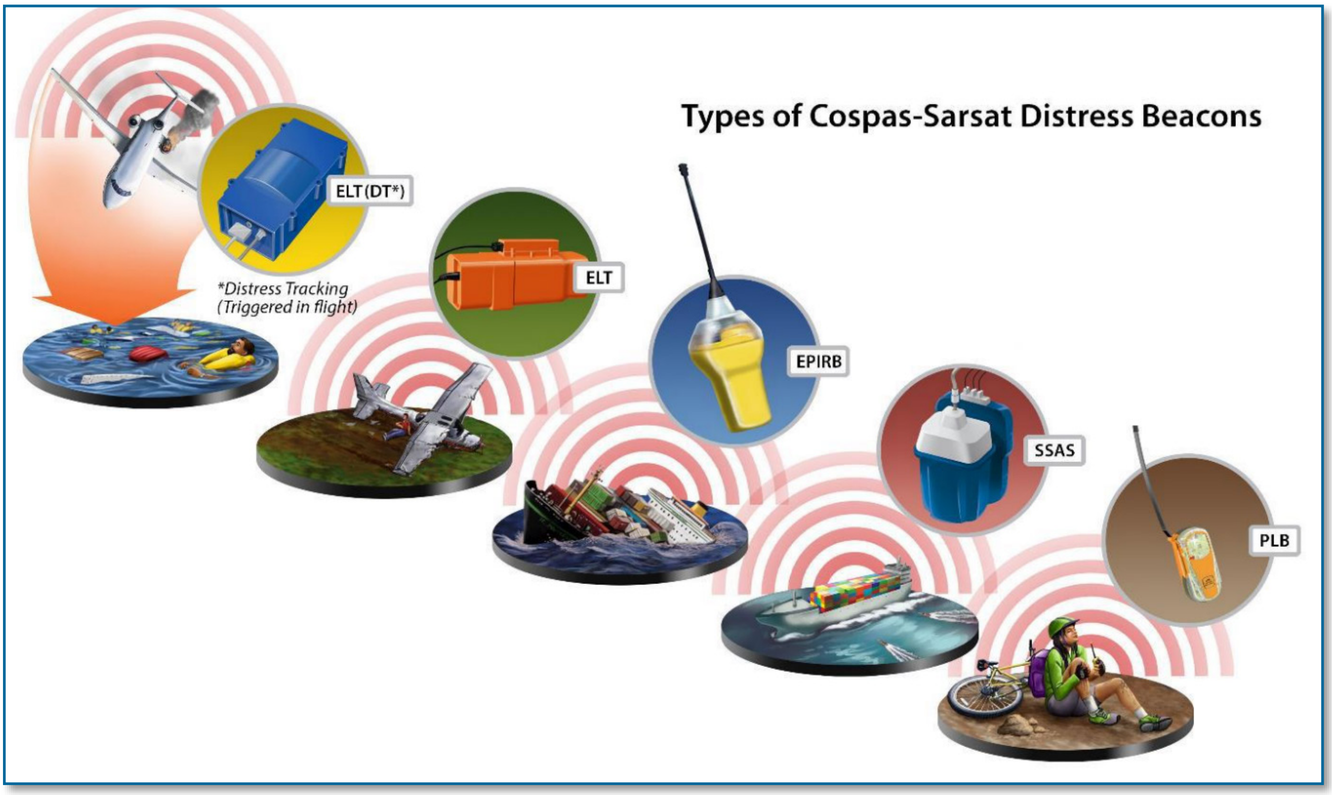
Search aircraft call signs and their report schedules should be passed to the alternate aircraft or to ATS.

Electronic Locator Beacon Search Operations

7. ELECTRONIC LOCATOR BEACON SEARCH OPERATIONS

7.1 The ELB Search Function

Distress beacons are carried by ships, aircraft and land parties and operate on one or more of the international distress, safety and calling frequencies. When activated to indicate a distress situation, they emit a characteristic signal. The signal serves, in the first instance, to alert to a distress situation and, during an ensuing electronic search, as a homing beacon. The ARC will use whatever resources are required to locate a distress beacon, even if it is believed to be an inadvertent activation.



7.2 Cospas-Sarsat

The International Cospas-Sarsat Programme is a satellite-based search and rescue distress alert detection system. The system was established in 1979 by Canada, France, the United States and the former Soviet Union. The name Cospas-Sarsat is formed from two acronyms. Cospas is an acronym for the Russian words "Cosmicheskaya Sistema Poiska Avariynich Sudov" which translates to "Space System for the Search of Vessels in Distress". Sarsat is an acronym for Search and Rescue Satellite Aided Tracking.

Cospas-Sarsat is a satellite system designed to provide distress alert and location data to assist SAR operations, using spacecraft and ground facilities to detect and locate the signals of distress beacons operating on 406 MHz anywhere in the world. The responsible Mission Control Centre (MCC) forwards the position of the distress and other related information to the appropriate SAR authority. Its objective is to support all organisations in the world with responsibility for SAR operations, whether at sea, in the air, or on land.

The Australian Mission Control Centre (AUMCC) is managed by AMSA, and processes data collected by satellite tracking stations in Australia and New Zealand.

7.2.1 Components of Cospas-Sarsat

The Cospas-Sarsat system consists of:

- Distress Beacons operating on the 406 MHz frequency, each with a unique identification code (HEXID) and capable of operating for 24 or 48 hours depending on their purpose.
- Satellites that detect, process and/or relay signals emitted by distress beacons:
  - Medium-altitude Earth Orbiting Satellites known as MEOSAR satellites.
  - Low-altitude Earth Orbiting satellites in near polar orbits known as LEOSAR satellites.
  - Satellites in geostationary orbit known as GEOSAR satellites.
- Ground based facilities used to handle the satellite signals and provide notification to the relevant RCC.
  - Local User Terminals (LUTs) receive and initially process the raw distress signal data relayed by a satellite.
  - Mission Control Centres (MCCs) perform the final processing and distribution of beacon detections.
  - Return Link Service Provider (RLSP) provides return transmissions to Return Link Service (RLS) enabled distress beacons to provide confirmation the beacon has been received and localised by the system and has been forwarded to the local RCC for actioning.

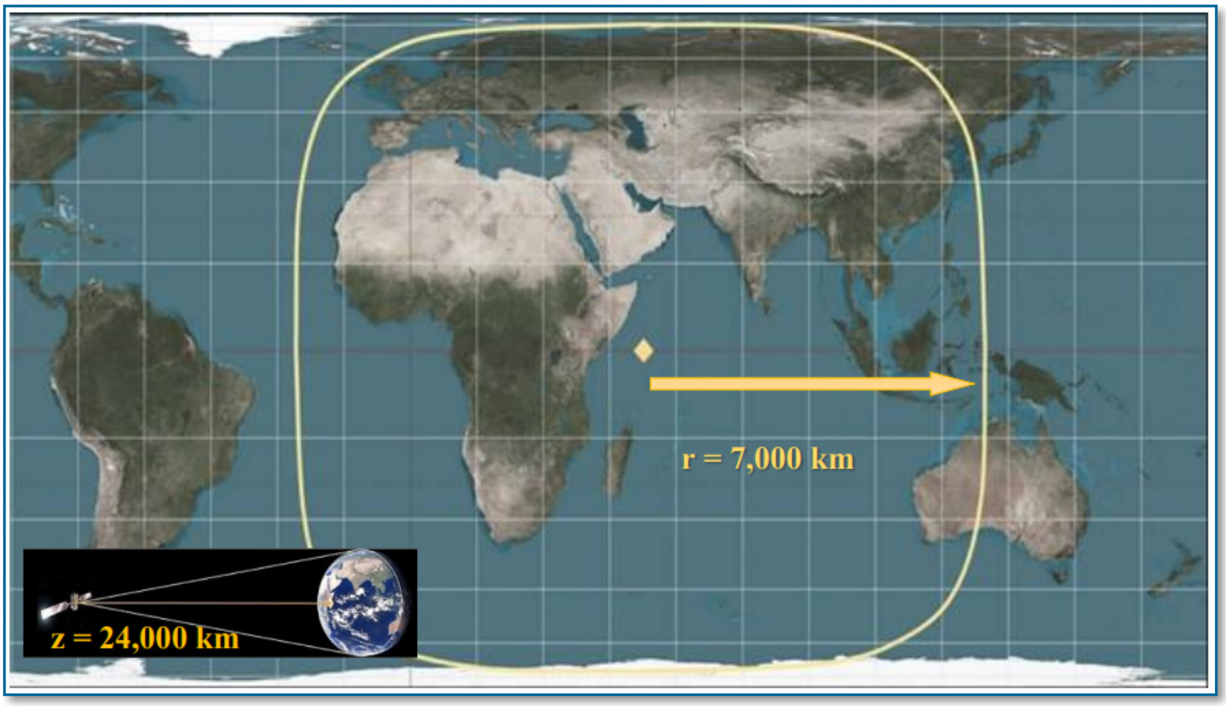
SATELLITES

The COSPAS-SARSAT system uses three search and rescue satellite constellations: LEOSAR, GEOSAR and MEOSAR. The 3 systems complement each other and information from all 3 systems can be used to locate a Distress beacon. Once the MEOSAR roll out is complete, the LEOSAR and GEOSAR satellites will be decommissioned.

MEOSAR

The MEOSAR satellites consist of satellites provided by the United States, the Russian Federation and the European Union. The full MEOSAR constellation will have about 72 satellites. These MEOSAR satellites orbit the Earth at altitudes between 19,000 and 24,000 km, a range considered as a medium-altitude Earth orbit. The footprint of a MEOSAR satellite is between 12000 and 13000 km and the satellites provide continuous global coverage of the Earth. These satellites send the beacon message back to earth where it is detected by a MEOLUT (MEOSAR Local User Terminal). With sufficient information, the MEOLUT will generate a location for the distress beacon. The beacon activation information is forwarded to a Mission Control Centre (MCC) and then to the relevant Rescue Coordination Centre (RCC) which responds to the beacon activation.

The MEOSAR system detects beacons in almost real-time (i.e. within 5 minutes). If the beacon is detected by three or more MEOSAR satellites, then the location of the beacon will be determined as well. When the full constellation of MEOSAR satellites is in operation, this will mean location will be determined within 10 minutes, 95 percent of the time. When fully operational the MEOSAR system will have between 4 and 8 satellites in view of any one point on earth at any one time.



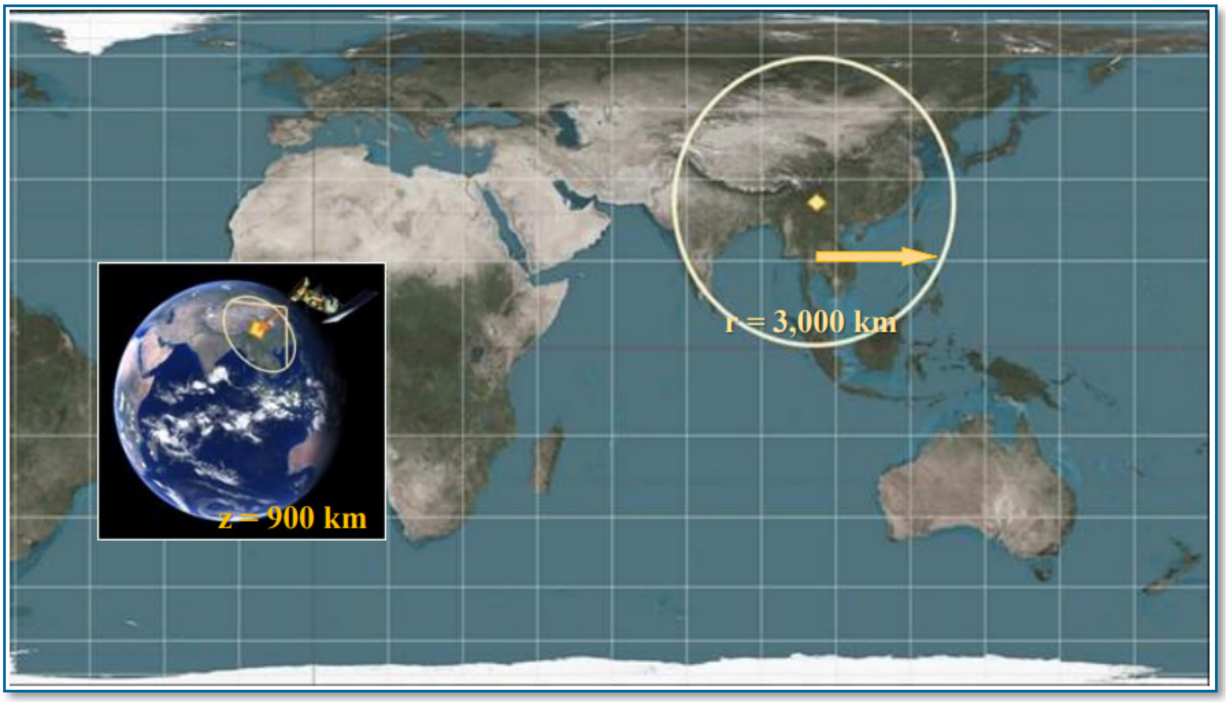
LEOSAR

Each LEOSAR satellite makes a complete orbit of the earth around the poles in about 100 – 105 minutes. The satellite views a "swath" of the earth of approximately 4000 km wide as it circles the globe, giving an instantaneous "field of view" about the size of a continent. When viewed from the earth, the satellite crosses the sky in about 15 minutes, depending on the maximum elevation angle of the particular pass.

LEOSAR satellites are not equally spaced and hence do not pass over a particular place at regular intervals. In view of this, pass schedules are computed for each LUT every day. On average a satellite will pass over continental Australia every 90 minutes but, because of the irregularity of passes, there could be up to five (5) hours between passes.

LEOSAR satellites are not always in view of a LUT, LEOSAR satellites have on built storage that stores the Distress Beacon's Information until the satellite comes within view of a ground LUT to download the data.

LEOSAR Satellites and associated LUT is able to locate non-GPS Distress Beacons though doppler processing of the beacon's frequency shift. Each Pass over the detected beacon generates two position estimates. A second satellite pass is required to resolve the ambiguity and identify the correct beacon location.

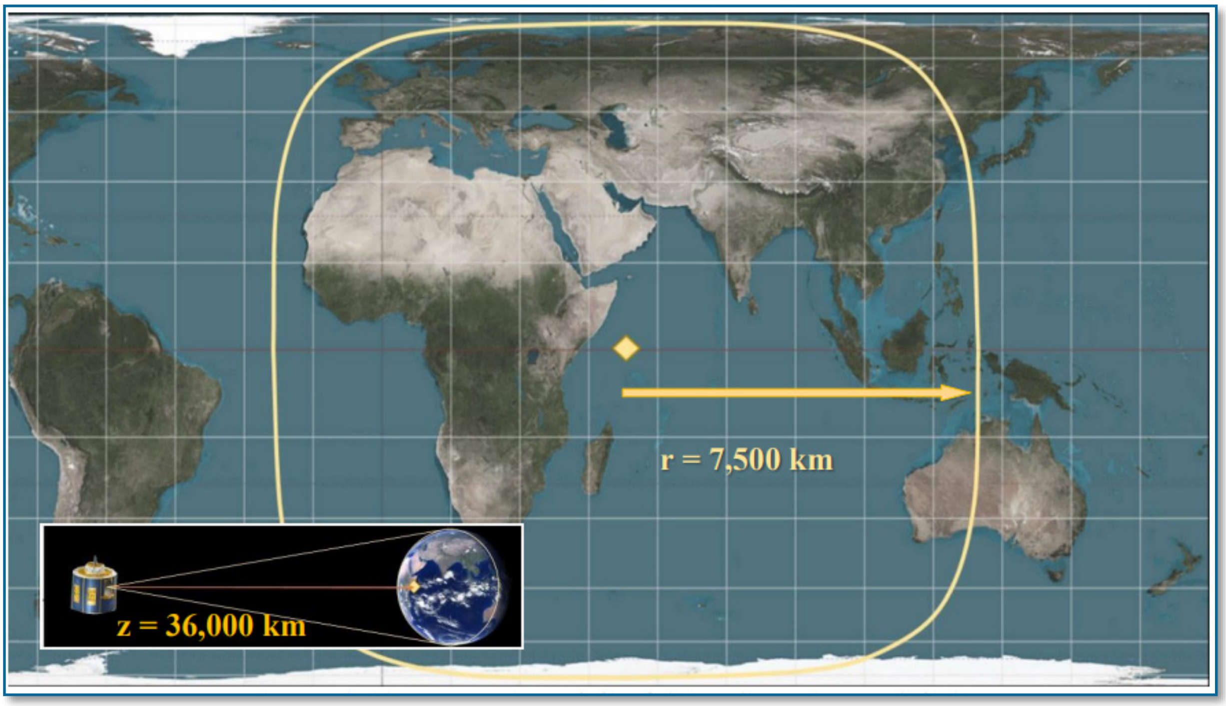


GEOSAR

The current GEOSAR constellation is composed of satellites provided by the USA, India, Russia and Europe. These satellites provide continuous global coverage for 406 MHz beacons with the exception of the Polar Regions.

As the GEOSAR satellites appear stationary from Earth, if the direct line of sight from the beacon to the GEOSAR satellite is blocked (for example, by terrain such as a mountain, called shadowing), the beacon will not be detected by the GEOSAR satellite.

GEOSAR Satellites are unable to locate a distress beacon on their own unless the location is encoded in the Distress Beacon's transmission (GPS enable Distress Beacon)



7.3 Distress Beacons

At the end of 2022 there were 2,360,000 registered Distress Beacons worldwide, and a total estimate of 3,100,000 units including unregistered Distress Beacons.

As at the end of 2024, there are an estimated 765,337 Distress beacons in Australia. It is estimated 20% of these beacons are currently unregistered.

406 MHz beacons come in two basic types: those that provide an encoded (GPS) location and those that do not.

Alerts from GPS equipped 406 MHz distress beacons may be received and processed by MEOSAR satellites and passed to ARC within minutes. The GPS capability allows a highly accurate position to be transmitted with the alert. Non-GPS beacons require processing before a position can be calculated.

GPS encoded 406 MHz beacons are far more accurate than non-GPS encoded beacons. GPS encoded beacons have accuracy to within 100m of the target compared to 5km for a non-GPS equipped beacon.

Properties of the 406 MHz Beacon

When a distress beacon is activated, it transmits a 406 MHz signal that is detectable by satellites and, where provided, an analogue 121.5 MHz signal detectable by ground stations and overflying aircraft to allow final stage homing. The 121.5 MHz signal can be detected by aircraft and ground parties equipped with direction finding equipment or VHF AM radios.

Power output for 406 MHz beacons is relatively high at 5 Watts. A 406 MHz beacon transmits a 0.5 second digital pulse every 50 seconds. The 121.5 MHz final homing beacon is relatively weak (25-100 mW) and may not be detected until the search asset is within close proximity to the target. This weak signal helps in the preservation of battery power.

Beacons are encoded with a unique code (HexID or UIN) that identifies the beacon. When a search asset is equipped with dedicated 406 MHz homing equipment this unique code along with encoded GPS information (if available) is available on the unit allowing target confirmation and accurate position information for the SAR crew.

When properly registered with AMSA or other country of origin, this unique code provides information about the boat, aircraft, or person carrying the beacon. This includes the owner's emergency contact and the country of registration. This allows false alarms to be resolved with a radio or phone call.

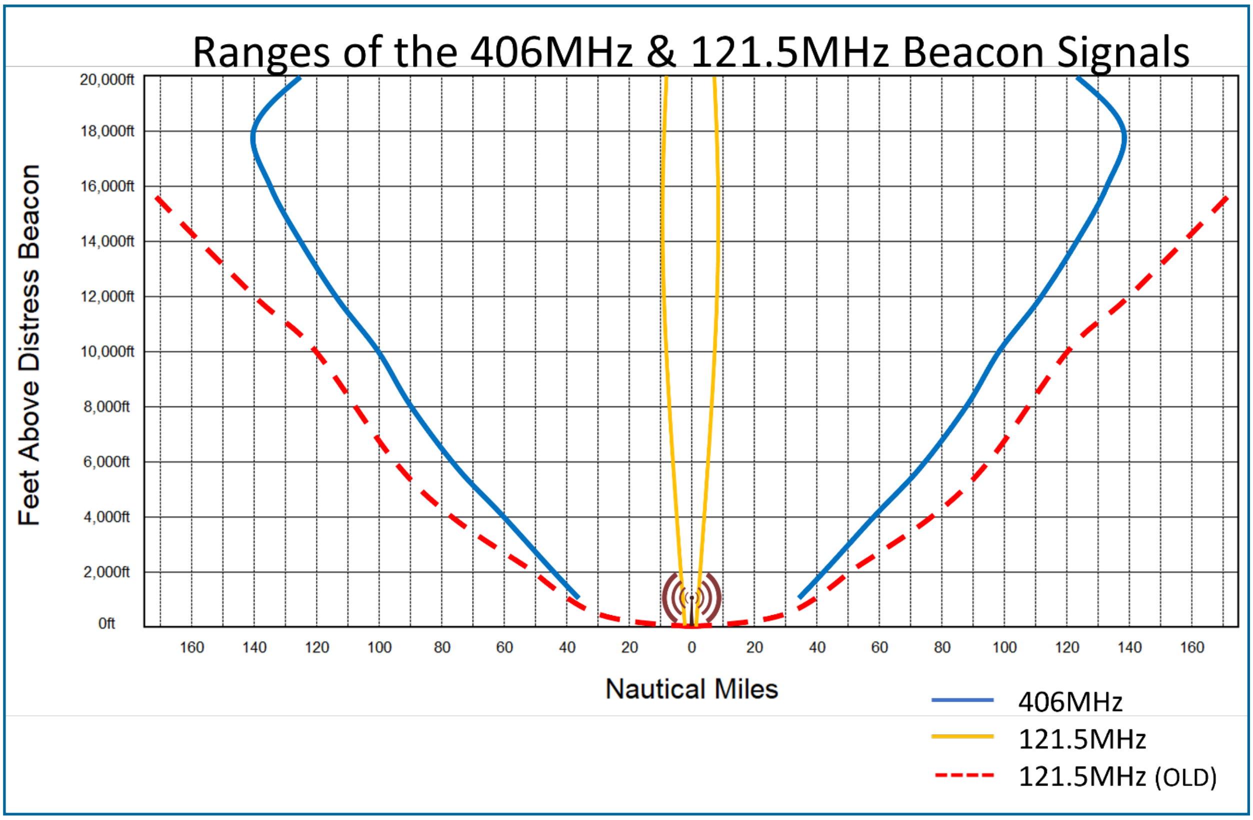
Types of 406 MHz Beacons

	PLB	EPIRB	ELT
	Personal Locator Beacon	Emergency Position Indicating Radio Beacon	Emergency Locator Transmitter
Usage	**Land**, maritime, air	**Maritime**, land, air	**Air**
Description	PLBs are smaller and easier to transport than other beacons and are designed to be worn or carried by individuals rather than vehicles.	EPIRBs are designed to float vertically in the water to optimise the signal to the satellite. Float-free EPIRBs are held in a bracket and fitted with a hydrostatic release deploying the beacon automatically if the vessel sinks. EPIRBs can also be manually deployed.	ELTs are designed to be fitted to aircraft.
Minimum Operations Time	24 hours	48 hours	24 hours

Properties of the 121.5 MHz Beacon Signal

Since 1 February 2009, only 406 MHz signals are detected by the Cospas-Sarsat satellite system. This affects all EPIRBs, ELTs and PLBs.

All 406 MHz beacons sold in Australia have a piggy-back 121.5 MHz signal to allow final homing by aircraft or ground parties. As a result of the stronger 406 MHz signal, the 121.5 MHz signal has now been reduced from a strong 100 mW continuous analogue signal to a much weaker 25 mW signal. Search aircraft will not pick up the 121.5 MHz signal until very close to the signal position.



New Beacon Technologies

AIS in Distress Beacons:

The Automatic Identification System (AIS) is a system of maritime communication devices that enable vessels and shore-based stations to send and receive identifying information to aid in situational awareness or collision avoidance. This identifying information can be displayed on a vessel's AIS receiver. To support Search and Rescue, AIS is optionally available in EPIRBs and PLBs to supplement the 406 MHz and 121.5 MHz signals.

AIS-equipped vessels within VHF range are notified of the beacon activation and provided information about the location of the activation. This allows nearby vessels with an AIS receiver to respond. In some cases, especially for a person overboard, this could be the quickest way for a rescue to take place, provided the vessel is equipped with an AIS receiver to be able to track the AIS beacon.

Return Link Service (RLS) in Distress Beacons:

An activated RLS enabled beacon receives an automatic acknowledgement that their distress alert has been received. When the RLS-enabled beacon receives the Return Link Message (RLM) it provides the user with reassurance the distress alert has been received. This is visible on the beacon e.g. coloured flashing light. The RLM does not mean that a rescue has been coordinated or launched.

Autonomous Distress Tracking (ADT)

First generation ELTs would be activated on impact via a G switch, or manually by the pilot. Second generation ELTs with ADT automatically activate if any predetermined distress conditions are met, such as unusual altitude or speed, collision with terrain, or total loss of engines. ADT systems can also be manually activated, however can only be switched off by the same means they were activated: i.e. manually turned on, manually turned off, speed returns back within operating limits.

Satellite Emergency Notification Devices (SEND)

Satellite Emergency Notification Devices are portable communication devices that use satellite technology to transmit distress signals and provide location information to emergency response centres.

Instead of the government-run Cospas-Sarsat system, SEND operate via commercially run networks that own satellites. When the SEND is triggered, this information is sent via satellite to a monitoring agency whose role is to pass the information to an appropriate responding agency.

SENDs generally allow two-way communication, high accuracy GPS location, & integrated SOS button. Examples of SENDs are SPOT, Garmin IN Reach, & iPhone Emergency SOS

IMPORTANT:

SENDs do not have any homing provisions and SRUs must rely on the GPS positions provided.

7.4 406MHz Beacon Homing.

Modern 406 MHz distress beacons use a 121.5 MHz homing signal with significantly reduced power compared to older 121.5 MHz-only beacons. The transmitter power has been lowered from 0.100 watts to 0.025 watts to minimise interference with aviation emergency communications on this frequency. Additionally with the transmitting antenna tuned for the 406MHz transmission the 121.5MHz radiated signal strength maybe less than 1/10th of the older 121.5MHz dedicated beacons.

While GPS-equipped 406 MHz beacons provide a location accuracy of better than 100 metres (or 1–3 nautical miles without GPS data), the lower-power homing signal means SAR assets may not detect it until they are very close to the beacon, often within a few hundred metres.

The 406MHz transmission is of a much higher ~5watts.

Approximate Detection Ranges for 406MHz Beacons (This may vary depending on beacon battery status, Over land or water, Obstructions, environmental conditions etc)

Aircraft Altitude (Above Beacon)	406MHz Transmission	121.5MHz Transmission
500ft	30nm	2nm
1000ft	40nm	3nm
5000ft	70nm	5nm
10000ft	100nm	8nm
15000ft	130nm	10nm
20000ft	110nm	8nm

7.4.1 406MHz Beacon Frequency Allocations

Channel #	Frequency (MHz)	Utilisation
A	406.022	Reserved
B	406.025	In Use
C	406.028	In Use
D	406.031	In Use
E	406.034	Reserved
F	406.037	In Use
G	406.040	In Use
H	406.043	Reserved
I	406.046	Reserved
J	406.049	Future Use
K	406.052	Future Use
L	406.055	Reserved
M	406.058	Reserved
N	406.061	Future Use
O	406.064	Future Use
P	406.067	Reserved
Q	406.070	Reserved
R	406.073	Future Use
S	406.076	In Use (Jan 25)

7.4.2 Homing a 406MHz Beacon.

Homing of a 406 MHz beacon does indeed require specialist Direction Finding (DF) equipment, and most rotary-wing rescue aircraft are equipped with this technology. The DF equipment is capable of detecting the 406 MHz distress signal and often includes the ability to decode the data burst transmitted by the beacon.

The 406 MHz data burst contains critical information, including:

- The Country Code of the beacon
- The beacon's HEX ID (a unique identifier)
- The beacon's Serial Number
- GPS location data, if available.
- Homing Frequency (121.5MHz, Maritime (9GHz SART), NIL)

This data helps the JRCC locate and identify the distress signal more effectively. However, it's important to note that the specific capabilities of DF systems can vary depending on the model and even the firmware version in use. For this reason, it's crucial for search and rescue (SAR) crews to familiarize themselves with the particular system installed on their aircraft.

Unlike the 121.5 MHz swept tone, the 406 MHz beacon transmits a short data burst that lasts for about 0.5 seconds, and it is broadcast approximately every 50 seconds.

Briefing Information:

Once you have been tasked by the JRCC for a beacon homing task you will received a Task Brief. The Task Brief includes importing information required to conduct the beacon homing

- **Beacon Datum** – Position of the beacon derived from the Beacons own GPS receiver ,via satellite doppler positions or Difference of Arrival calculations.
- **HEX ID** – The unique identifier of the Distress beacon.
- **Beacon Frequency** – The Frequency the beacon transmission was received on. This may be slightly different to the 406MHz Beacon Frequency Allocations table above. Crews should use the table to find the most probable beacon channel of the beacon.
  - Example Below 405.0278 should be used as a Channel C beacon with a 406.028MHz frequency for homing's.

Situation

Situation As Exists

UNREG AUS EPIRB detected on 406.0278Mhz in the Townsville area.

1.Beacon Homing

Datum:	19 19.40` S, 146 50.20` E	Search Height:	
Datum Desc.	BEEE401D10002C9 - AUSTRALIA 406.0278Mhz		

Aerial Direction Finding Procedure for 406 MHz Beacons

Direction-Finding Equipment Setup

Since there are various makes and models of aerial DF equipment, it is critical to understand the operational specifications of the specific system being used.

- **406 MHz Monitoring:**
  - Configure the DF equipment to monitor the 406 MHz frequency associated with the beacon.
- **121.5 MHz Monitoring:**
  - If the DF equipment supports dual-frequency monitoring, program the secondary frequency to 121.5 MHz to detect the homing signal.
  - If the DF equipment cannot monitor a second frequency simultaneously, program 121.5 MHz into the aircraft's VHF communication system to monitor the homing frequency.
- **Sensitivity Settings:**
  - Adjust the squelch levels to the most sensitive setting to ensure maximum detection capability.

Conducting a 406 MHz Beacon Search

- Search Altitude Selection:
  - Determine the search altitude based on weather conditions, airspace restrictions, and ATC clearances.
  - Use detection range tables (above) to estimate the detection range for the chosen altitude.

Note:

Initial search altitude should be as high as practical for the aircraft type, considering air traffic and meteorological conditions.

- **Tracking to Reported Position:**
  - Navigate toward the beacon's last known or reported position.
  - Continuously monitor DF equipment for signs of signal detection.

Beacon Detection and Tracking

- Upon receiving a 406 MHz transmission:
  - Adjust the flight path to track the direction indicated by the DF equipment.
  - Monitor for subsequent transmissions, as 406 MHz signals are transmitted approximately every 50 seconds.
    - If the DF equipment lacks a "last signal heard" timer, use a chronograph or stopwatch to track the interval between bursts.
  - Maintain tracking adjustments to refine the flight path toward the source.

Data Decoding (if equipped):

- For DF equipment capable of decoding 406 MHz transmissions, monitor the decode page or message screen for beacon data.
- Verify the following information upon receipt:
  - Hex ID: Ensure this matches tasking details if available.
  - GPS Position (if included in the beacon signal):
    - Cross-check the GPS position against current track.

Altitude Adjustment:

- Gradually descend to the operating altitude while maintaining the beacon's signal within the transmission cone.

Transition to 121.5 MHz Tracking:

- Once a continuous 121.5 MHz swept tone is detected, shift focus to DF homing on this frequency.
- Use the 121.5 MHz homing signal for precise localization of the beacon.

IMPORTANT:

Communicate findings, including beacon data and updated positions, to the ARC when possible.

7.5 Aural Homing on a 121.5 MHz Signal

Aircraft of opportunity not fitted with a homer can carry out effective homing to a 121.5 MHz beacon signal by using a technique called aural homing.

Aural procedures assume that an undistorted radiation pattern is very near circular.

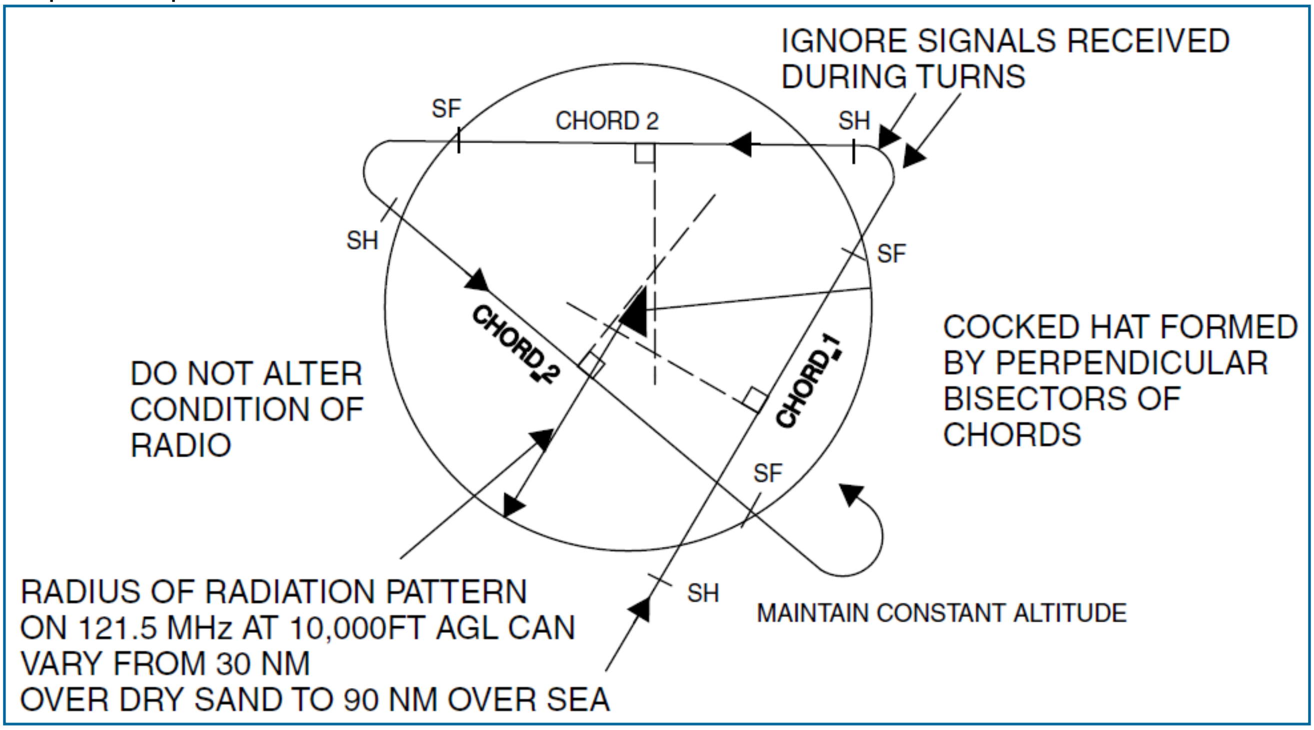
Complete guidance on aural homing is given in the AIP/ERSA, however, ARC shall brief pilots unfamiliar with the procedures.

7.5.1 Aural Homing Technique

Initial Aural Search

The following procedures should be used during initial aural search:

- Set the aircraft receiver to its most sensitive condition: squelch disabled.
- Note and report the position at which the signal is first heard (SH) and fades (SF) and do not change altitude or the condition of the radio.
- After the signal has faded select a heading estimated to take the aircraft through the radiation pattern, ignoring any beacon signals received during the turn.
- Continue chording the radiation pattern until it is possible to establish a cocked hat for the probable position of the beacon.



Final Homing Procedure

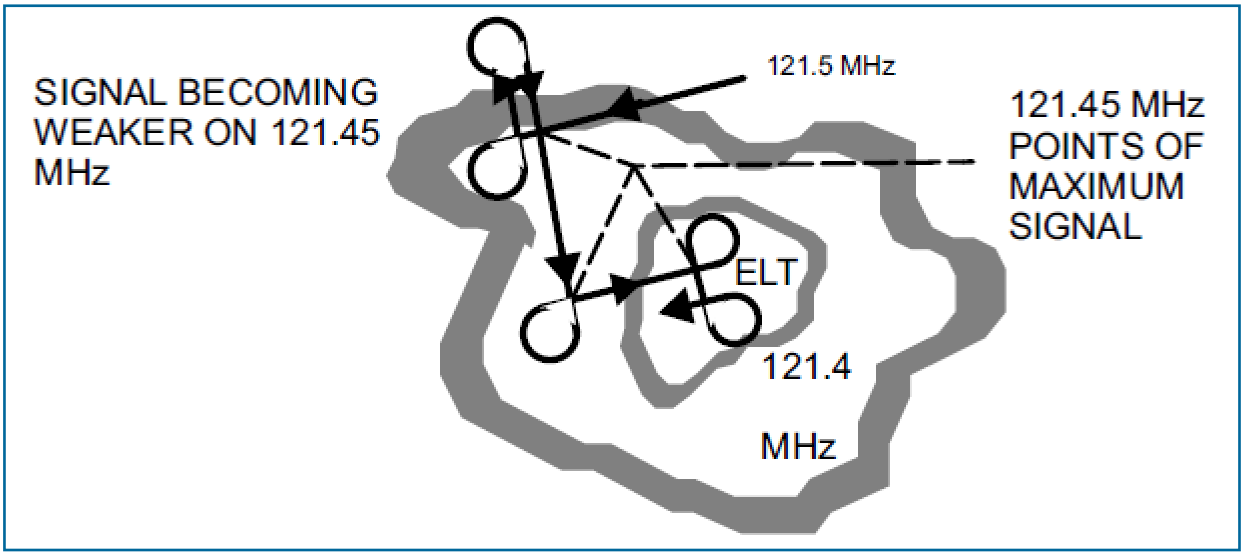
The final homing procedures are:

- Track towards the estimated centre of the radiation pattern.
- Set the aircraft receiver to its most sensitive condition and descend, if possible, to be between 1000 and 2000 feet above ground level in the estimated centre. When the signal from the beacon is very strong and very clear, detune the frequency to 121.45 or 121.55 MHz
- Traverse the area bounded by the cocked hat, listening for the beacon on the detuned frequency.
- On hearing the signal on the adjacent frequency, select and fly a heading which results in a stronger signal. As the signal increases in strength, detune further and descend as required.

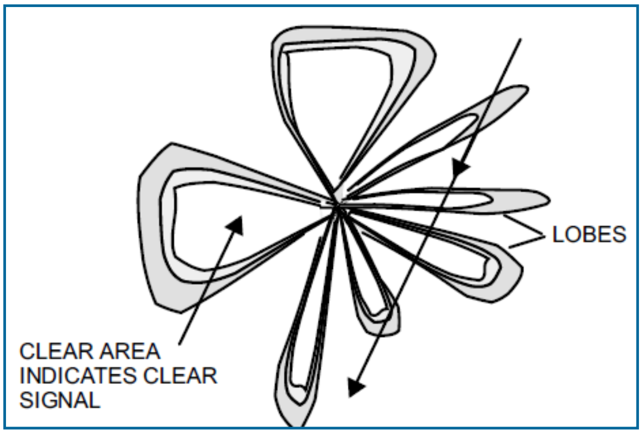
At this stage it is most important that each track should be a straight line. Helicopter pilots should avoid any tendency to orbit a suspected site.

The accuracy of the homing will usually depend upon how far off frequency the signal can be heard. Observers will find that a signal being received on, for example, 121.3 or 121.7 MHz (over land) will rise to a sharp peak only as the search aircraft passes over the beacon site at 500FT above ground level. Where the terrain is heavily timbered (e.g. rain forest), helicopter pilots should descend to lower levels and detune further to achieve greater accuracy. Information gained during straight and level flight only is most important and is the only data that should be used.

Where the signal is irregular, it is usually because the beacon is located amongst obstacles such as trees, rocks, wreckage, etc. The resultant radiation pattern is no longer circular, and the signal heard/signal fade principles no longer apply.



Lobbing Signal Procedures

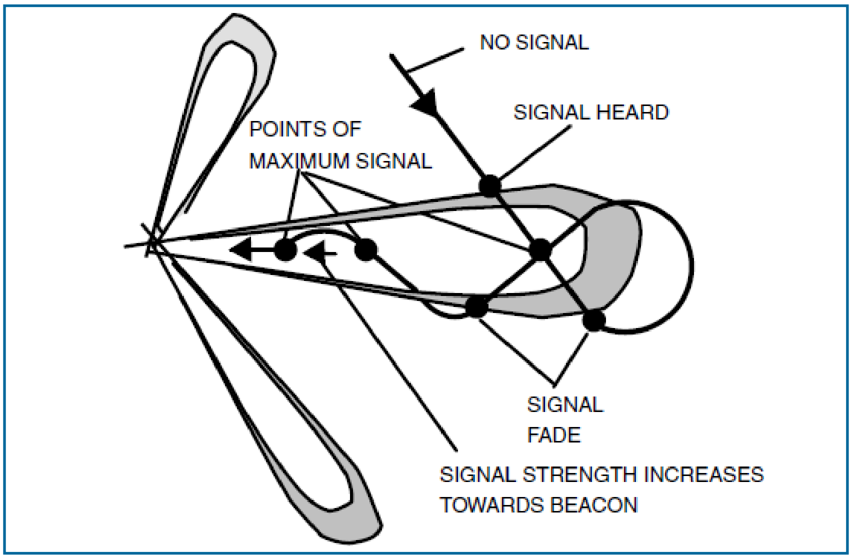


Where the signal from the distress beacon is broken and distorted, it is probably because the beacon is amongst obstacles such as wreckage, trees, rocks, etc, which cause the signal to be absorbed or reflected, forming lobes.

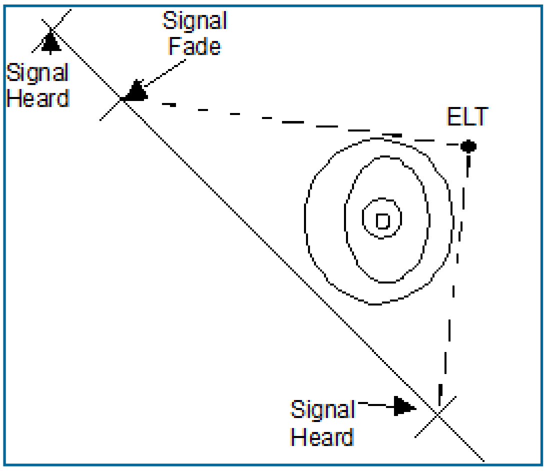
The position of the beacon may be eventually located with greater accuracy by progressively detuning the VHF receiver to 121.3 MHz or 121.7 MHz

The radiation pattern from a distress beacon can either be approximately circular (regular) or lobular (distorted).

Intercepting a Lobe



Terrain Shielding



The beacon signal is attenuated or interrupted by terrain. Therefore, if the signal fades when flying in hilly terrain, it can be assumed that the signal source is located on the opposite side of the terrain to the aircraft.

In hilly terrain, it is possible to use this method using several different mountains.

7.6 Ground DF Principles

7.6.1 The Beacon Location Problem

There are three parts to this problem:

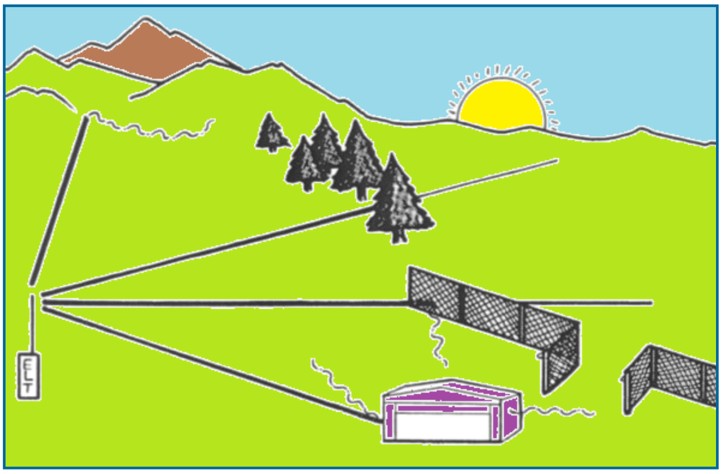
- Get to a point where the beacon signal can be heard,
- Establish a direction to the target or a target location, and
- Get to the target.

Execution of these steps will vary radically from incident to incident. On an airport, it may be as simple as walking out of a door, taking a single DF bearing and walking to the offending aircraft.

There are three characteristics of a beacon signal that must be understood in order to locate the signal transmitter:

- Unimpeded radio signals travel in a straight line,
- Conductive objects reflect and/or block the signal, and
- Signals get stronger near the source regardless of the direction of approach. In addition, the rate of change in signal strength will be faster as you get closer.

Reflectors and Barriers



Conductive objects that reflect and/or block beacon signals include man-made objects such as buildings and natural ones like mountains, smooth wet snowfields and grasslands. These objects are called ‘reflectors’ because they cause the beacon’s signal to bounce off, much like a mirror reflects images.

They can affect the receiver’s ability to hear and obtain directional information on the beacon’s signal.

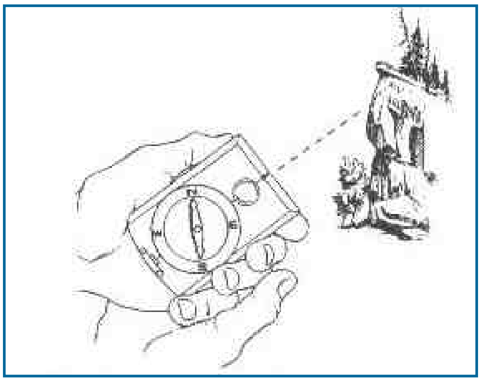
Reflections have less power; therefore, if the DF unit can hear the direct (stronger) signal, it will prefer it to the weaker reflective one.

For a beacon search, this usually means going for higher ground or conducting an air search. This will both get away from nearby reflectors and possibly improve the chance of getting a clear view of the source over the obstructions.

7.6.2 Ground Homing Triangulation Method

To plot the location of a beacon, some knowledge of the operation of a compass and magnetic variation will be useful. Triangulation can be used to indicate the general location of the signal; this can be followed up with a more precise DF in the triangulated area. The triangulation method can be used to DF a signal anywhere where there is an unobstructed view, i.e. from high ground. Roofs of buildings also count as high ground.

(The eyeball method can also be used, although it is less accurate).

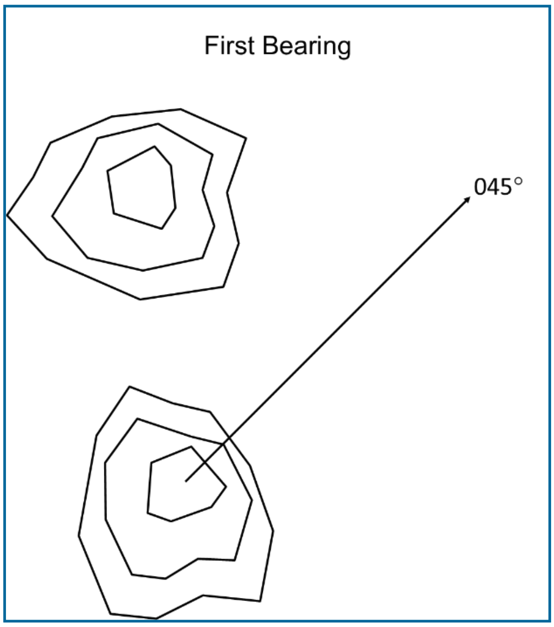


First Bearing

A minimum of two bearings can be used for triangulation. The more bearings taken – the more accurate the beacon's position.

You must be receiving a clear signal:

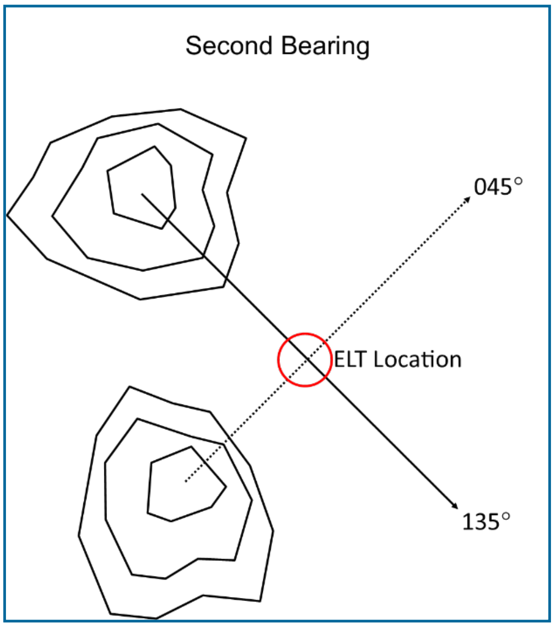
- Position yourself on high ground.
- Centre up DF unit on the signal.
- Take the magnetic bearing (shoot an azimuth).
- Correct for magnetic variation.
- Plot your bearings (draw a line) on map.



Second Bearing

- Move to another location (high ground).
- Centre up DF unit on the signal.
- Take the magnetic bearing (shoot an azimuth).
- Correct for magnetic variation.
- Plot your bearings (draw a second line) on map.
- The beacon should be where the lines cross!

The positions where the bearings are taken from should be plotted on a map or rough sketch. In the event that the signal is lost, a return to a bearing site will confirm if the signal has ceased transmitting.



Magnetic Variation

Note: Iron ore deposits throughout the earth affect compasses, causing them to not point at the true north, but rather magnetic north. This variation is known, and maps will show the corrections to be made in the form of the magnetic variation. In Australia, it varies from 11º E to 4 º W. This variation will be displayed on a map.

To apply the magnetic variation, carry out the following:

- **From Compass to Map** - Add degree variation for East and subtract degree variation for West.
- **From Map to Compass** - Subtract degree variation for East and add degree variation for West.

Obstructions to the Beacon Signal

If moving to higher ground isn't possible or doesn't work, a methodical search will probably be required to find a place where the source can be seen clearly. In most cases, clear view is distinguished by a positive direction that does not change much as the observer moves.

The effects of obstructions in the path between the beacon and the DF unit can be roughly grouped according to their location:

- Obstructions near the transmitter,
- Obstructions near the receiver, or
- Obstructions at intermediate range.

Obstructions near the transmitter (beacon) affect the signal distribution or directivity of the source like the reflector of a flashlight. They affect both the ability to hear a signal at a distance and the intensity of reflections. Both obstructions near the receiver and at intermediate range will block or reflect the beacon signal but those near the receiver (DF equipment) are more visible, more severe, and are easier to avoid.

7.6.3 Locating a Beacon at an Airport

Use your receiver with an external antenna on the vehicle as shown below and drive completely around the airport, or as nearly so as you can. Determine where your left-right homer indicates the location of the beacon or the area of highest signal strength so you can begin your foot search close to the problem. If your mission is at night or in bad weather, particularly at an airport without an operating control tower, don't rule out the possibility of an actual crash on or very near the airfield, it has happened.

To begin your foot search, walk out on the ramp away from buildings, planes, cars, etc., where you have a good view of the airport. Find the direction to the beacon using the left-right **DF** mode, maximum signal strength in the **Receive** mode, or by body shielding.

Walk to another clear area about 50 m away while watching the meter as you move. In **DF** mode, left to right needle swing is normal; just keep swings about equal. Needle movement can also be expected in the **Receive** mode. The DF will point to an area of hangars, buildings, or aircraft. Walk in the indicated direction while listening to the beacon.

It is important to continue to decrease the sensitivity control of your receiver (or detune a tuneable receiver) as the volume or strength of the beacon increases. Don’t adjust the volume control; this is particularly critical during that "last 100 m" to the beacon. Don’t remove the antenna; with no antenna, the volume of many radios depends more on how they are held than the signal direction.

If the beacon is in an aircraft (or vehicle) parked out in the open on the ramp, you should be able to walk right to it with whatever equipment you're using. With a tuneable radio, you'll be able to hear the beacon while tuning over almost the entire band.

Look for the beacon antenna on top of the aircraft fuselage aft of the cabin. To double check your finding, detune your receiver or touch the DF antenna to the suspected beacon antenna. Adjust the sensitivity (not volume) until the signal is weakly audible. If the beacon signal disappears when the antennas are separated by only a few inches, you have the right one.

If your DF unit is convinced you've found the right airplane, but you don't find an external antenna, there may be a portable beacon located inside. This is common for home-built or experimental aircraft and small helicopters.

Final Location of the Beacon

Once a source has been pinpointed on the ground, walk completely around it, using the DF to verify that the signal is coming from this target. Repeat this circle further away if possible. If this is indeed the source of the signal, then the DF will still point back towards the target, but the signal will be weaker. Surrounding the signal is an absolute must if the actual source is not apparent, as when the signal appears to be coming from inside a building.

If a complete walk around of a building cannot be accomplished or is inconclusive, get as legally and safely close as possible and place the DF near doors, windows vents or other openings to the inside. If the source is inside, the signal should be stronger at these locations.

Inside buildings, hangars and ships, DF is difficult or near impossible. Body shadowing may help and should be tried. An orderly search of the building should be undertaken until the offending signal is located.

Station Passage

Station Passage will be indicated by a signal fade and/or a swing on the Strength Meter.

To confirm the suspected beacon location, go past the point of signal fade (about 5 to 10 steps only) and turn 180º and move over the same area again. To be sure go over the same area, only this time come in 90º to the original track.

The area (over the signal) at which the left-right readings fluctuate, or the signal loses strength is referred to as the Zone of Confusion or the Cone of Silence.

At this point, the source of the beacon, if on the ground should be visually obvious to yourself or your observers. If you experience signal fade, you are over the beacon's position. Either start looking up or start digging.

7.7 Ground Homing Equipment

7.7.1 Ground DF – Titley RX3

Rescue and Test Frequency

The unit can be used in the operational role (Rescue Frequency) on 121.5 MHz and in the training role (Test Frequency) on 121.4 MHz.

To switch between the Rescue Frequency and Test Frequency, the rear cover of the reciever must be removed and the switch positioned as required.

An audible tone and red LED on the front pannel indicates if the unit is in the Test Frequency position.

Testing the Titley

- Turn the GAIN control fully clockwise.
- Place the MODE switch to NORM.
- Turn the receiver ON by rotating the VOLUME control fully clockwise position.
- A loud hissing noise should be heard from the built in speaker, which should diminish as the GAIN control is turned anticlockwise.
- With the MODE switch in the TONE position, a slow ticking noise should be heard. The stronger the signal the higher the pitch of the tone.
- With the MODE switch in the NORM position, the actual audio modulated signals transmitted by the EPIRB should be heard. The louder the signal heard, the stronger the signal.

Operational Mode

- Turn the unit on by turning the VOLUME control clockwise.
- Set GAIN control initially to fully clockwise.
- Upon hearing a signal, adjust the sensitivity slowly by rotating the GAIN control anticlockwise from the maximum GAIN setting until the maximum reading on the signal strength meter is approximately 0 μV (this will ensure the receiver is not overloaded).
- As the signal strength increases adjust the sensitivity counterclockwise with the GAIN control.

Training Mode

When using the Titley RX3 DF Unit in the 121.4 MHz training mode, the **TEST FREQUENCY** indicator on the front panel will flash red once per second and two (2) short beeps will be heard every four (4) seconds. The unit will still act normally.

Maintenance

The Titley RX3 DF unit can be used in reasonably hostile environments. However, some deterioration due to corrosion etc would be expected with continious exposure to rain/marine environments.

To prolong the life of the unit, carry out the following:

- Try to protect the unit with minimal exposure to the environment.
- Cover the receiver with plastic or similar material if operating in rain or sea spray.
- Wipe down the antenna and receiver after use.
- Do not leave the unit in the sun or in a vehicle for prolonged periods.

The Titley RX3 - DF Unit should be stored in its protective bag in a cool, dry preferably low humidity environment.

The flexible antenna extensions should be checked for damage prior to use. If a damaged extension is found, contact AMSA to arrange an immediate replacement.

IMPORTANT:

FOLLOWING ANY TRAINING, THE RX3- DF UNIT MUST BE SET BACK TO ‘RESCUE FREQUENCY’.

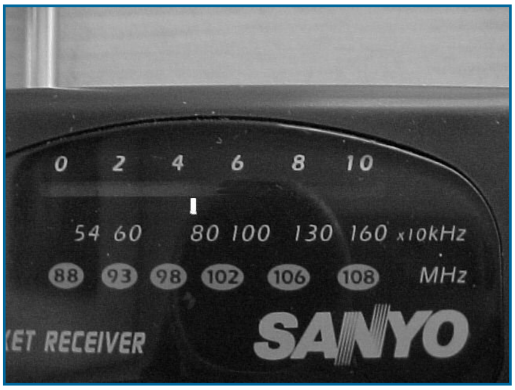
7.7.2 Ground DF – Handheld Airband VHF Receiver

Tune the receiver to 121.5 MHz

If a beacon is heard, proceed as follows:

- Detune the receiver to 121.45 or 121.55 MHz
- If a beacon signal is still being heard, you are within approximately 100 m of the beacon.
- Look for a likely source of the signal and move towards the area likely to be producing the signal. If you progressively detune the radio away from 121.5 MHz (e.g. 121.4, 121.35 MHz and even further) and continue to receive the signal you are getting closer to the beacon.
- When you are within one (1) m of the beacon, the beacon signal will break through on all frequencies. If possible, remove the antennae from your portable VHF radio. If the signal can still be heard, you are extremely close to the beacon. Look for the source.

7.7.3 Ground DF – Handheld FM/AM Receiver



An FM radio tuned to 99.5 MHz will pick up a beacon signal at a range of approximately one (1) kilometre.

An AM radio will pick up a beacon signal on any frequency at less than three metres and can be used to check individual aircraft.

Note: There is the possibility that a beacon radiating from inside a closed hangar or storage container may be shielded altogether from a receiver outside the hangar.

Note: Modern car radios do not pick a beacon signal as well as radios fitted to older model cars.

7.8 Actions Following Beacon Location

Looking for and tendering to survivors takes priority over securing a beacon. Leaving it on initially may also help other personnel locate the site. Once the crash scene is under control, move only what is necessary to locate and secure the beacon. Do not move it or take it for safekeeping but note its location and the position of the ON/OFF switch before it was turned off. Pass this information along to other rescue and investigation personnel to minimise the chances of it being turned on accidentally later.

SRU personnel do not have the authority to enter any aircraft, boat, vehicle or building, whether locked or not, or board boats to secure a beacon. For signals coming from boats and aircraft, marina or airport operators/security or local Police should be contacted for assistance. Even these personnel will not be able to enter the boat or aircraft but may be able to assist in locating the owner. In all cases contact the ARC and inform them of your findings.

If the signal is coming from a building that is closed, try to find a phone number of an emergency alarm company or security company on the building; these are usually located near a door. Local Police may also be able to assist with owner contact details.

For safety reasons, once again, Police assistance should be called when the signal is detected coming from a private residence. Ground search team members will most likely have to talk to the occupants, as it is unlikely that the Police Officers will have any knowledge of beacon DF procedures.

Once the signal has been shut off, either by the switch or removal of the batteries, confirm no other signal is being transmitted and contact the ARC.

IMPORTANT:

It is imperative that the source of the signal be identified, then steps taken to switch the signal off

Also, notify the ARC of the time the beacon was shut off; the aircraft type and number, if any; beacon make, model, and serial number; owner's name; and circumstances causing activation, if known.

If access cannot be obtained to a parked aircraft found to be emitting a beacon signal, the ARC is to be informed of the situation and airport staff located and informed, so that the owner can be contacted. The ARC may be able to assist you with the aircraft owners contact details.

With a small amount of practice, trained SRU personnel should be able to track a beacon signal to its source, be it on an airfield, in a marina or located within a built-up area, safely secure the beacon and keep the ARC advised of progress.

7.9 Air-to-Air Homing

It could occur that the SRU may be called upon to provide navigational assistance to a pilot of an aircraft that is unsure of his/her position.

The following method may be used to locate and assist such an aircraft.

- Once contact is established on an appropriate frequency, instruct aircraft to orbit in its present position.
- Establish aircraft's height and endurance (pass this on to the ARC via ATC).
- Instruct aircraft to remain at that height and advise if any change is required due weather etc.
- Advise aircraft of the height you will be at, to look out and advise on sighting.
- Request aircraft's approximate position. Advise aircraft you will take over navigation responsibility once position is positively established.
- Instruct pilot to KEY mike for 60 seconds. No talking is required. Do this as often as necessary.
- Observe DF needle movement. Turn until needle is roughly centred. If there is no needle movement, turn aircraft to resolve ambiguity.
- Once you are sure of the rough heading to the target aircraft, make small heading changes. Use heading bug to assist.
- Needle will tend to oscillate up to 10° either side of the direct track to the target aircraft. This may be due to the target aircraft orbiting.
- Assume the pilot of the target aircraft is not formation endorsed.
- Give target aircraft a heading to a place of safety, plus distance and time.
- Inform the ARC via ATC that you have located the target aircraft and your destination and ETA.
- Stay with target aircraft and keep the pilot informed of what you are doing.

NOTE

Make it clear to the target aircraft that you will maintain separation at all times.

Medical Evacuations from Vessels

8. MEDICAL EVACUATIONS FROM VESSELS

Vessels at sea can request medical advice via HF DSC radio or Inmarsat satellite services. The service has been put into place for SOLAS vessels, but other craft may use the service in emergencies. This service is free and is available via Inmarsat-C fitted vessels using Special Access Code 32 for medical advice and 38 for medical assistance or MEDEVAC. Arrangements are made through the ARC.

Search and Rescue services will normally only consider a medical evacuation after advice has been received from medical authorities recommending medical evacuation. Medical advice is required to determine the best course of action. A vessel may need to divert to port, conduct a boat transfer or make ground towards the coast to permit a helicopter transfer.

If medical evacuations from vessels are being considered, the benefits must be weighed against the inherent dangers of such operations to both the person needing assistance and to the rescue personnel.

When medical assistance is required, information as indicated below would be sent to the ARC. Additional information may be gathered as required in certain cases.

- Name of the vessel and radio call sign.
- Position of the vessel, port of destination.
- Estimated time of arrival, course, and speed.
- Patient's name, age, gender, nationality, and language.
- Patient's respiration, pulse rate, temperature, and blood pressure.
- Location of pain.
- Nature of illness or injury, including apparent cause and related history.
- Symptoms.
- Type, time, form, and amounts of all medications given.
- Time of last food consumption.
- Ability of patient to eat, drink, walk, or be moved.
- With accident cases, how the accident occurred.
- Whether the vessel has a medicine chest, and whether a physician or other medically trained person is aboard.
- Whether a suitable clear area is available for helicopter winch operations or landings.
- Name, address and phone number of vessel's agent.
- Last port of call, next port of call, and ETA to next port of call.
- Communications and homing signal available.
- Additional pertinent remarks.

The final decision about whether it is safe to conduct an evacuation remains ultimately with the person in command of the rescue facility tasked with conducting the evacuation.

8.1 Requesting Helicopter Assistance

When the ARC arranges for the evacuation of a patient by helicopter, the following points will be considered.

- Arrangement of a rendezvous position as soon as possible if the vessel is beyond helicopter range and must divert.
- Gather as much medical information as possible, particularly about the patient's mobility.
- Advise immediately of any changes in the condition of the patient preparation of patient before the helicopter arrives.
- Move the patient as close to the helicopter pick-up area as the patient's condition permits.
- Ensure the patient is tagged to show details of any medication which has been administered.
- Prepare the patient's seaman's papers, passport, medical record, and other necessary documents in a package ready for transfer with the patient.
- Ensure that personnel are prepared as necessary to move the patient to the special stretcher (lowered by the helicopter) as quickly as possible.
- The patient should be strapped in the stretcher face-up, in a lifejacket if condition permits.

8.2 Vessel Preparation

The following information should be exchanged between the helicopter and the vessel to prepare for helicopter operations:

- Position of the ship.
- Course and speed to the rendezvous position.
- Local weather situation; and
- How to identify the ship from the air (such as flags, orange smoke signals, spotlights, or daylight signalling lamps).

The following checklist will be used by the ship's deck officer prior to helicopter-ship operations. The checklist was created for a large merchant vessel, but the information is pertinent for any size vessel.

8.2.1 Shipboard Safety Checklist

To Be Checked by Officer in Charge

- Have all loose objects within and adjacent to the operating area been secured or removed?
- Have all aerials, standing or running gear above the operating area been secured or removed?
- Has a pennant or windsock been hoisted where it can be clearly seen by the helicopter pilot?
- Has the officer of the watch been consulted about the ship's readiness?
- Does the leader of the deck party have a portable radio transceiver for communicating with the bridge?
- Are the fire pumps running and is there adequate pressure on deck?
- Are fire hoses ready? (hoses should be near to but clear of the operating area)
- Are foam hoses, monitors, and portable foam equipment ready?
- Are dry powder fire extinguishers available and ready for use?
- Is the deck party complete, correctly dressed, and in position?
- Are the fire hoses and foam nozzles pointing away from the operating area in case of inadvertent discharge?

- Has a rescue party been detailed?
- Is a person-overboard rescue boat ready for lowering?
- Are the following items of equipment to hand:
  - Large axe?
  - Crowbar?
  - Wire cutters?
  - Red emergency signal/torch?
  - Marshalling batons (at night)?
  - First-aid equipment?
- Has the correct lighting (including special navigation lights) been switched on prior to night operations and not directed towards the helicopter?
- Is the deck party ready, wearing brightly coloured waistcoats and protective helmets, and are all passengers clear of the operating area?
- Has the hook handler been equipped with helmet, strong rubber gloves and rubber-soled shoes to avoid the danger of static discharge?
- Is access to and egress from the operating area clear?
- Has the radar been secured or placed in standby mode just before the helicopter arrives?

8.2.2 Landing On

- Is the deck party aware that a landing is to be made?
- Is the operating area free of heavy spray or seas on deck?
- Have side rails and, where necessary, awnings, stanchions, and other obstructions been lowered or removed?
- Where applicable, have portable pipes been removed and have the remaining apex ends been blanked off?
- Are rope messengers to hand for securing the helicopter, if necessary? (Note: only the helicopter pilot may decide whether or not to secure the helicopter.)
- Have all personnel been warned to keep clear of rotors and exhausts?

Tankers: Additional Items

- Ships not fitted with an inert gas system: Has pressure been released from tanks within 30 minutes of commencement of helicopter operations?
- Ships fitted with an inert gas system: Has pressure in cargo tanks been reduced to slight positive pressure?
- All tankers: Have all tank openings been secured following venting operations?

Bulk Carriers and Combination Carriers: Additional Items

- Has surface ventilation to dry bulk cargoes ceased, and have all hatch openings been fully battened down prior to helicopter operations?

Gas Carriers: Additional Items

- Have all precautions been taken to prevent vapour emission?

- Vessels which are not well suited for helicopter landing operations (due to their size, design or nature of their cargoes) should carefully consider how to best remove or deliver those people or equipment in an emergency.
- Emergency procedures might consist of evacuation of an injured person or delivering a doctor on board by winching.

Incident Site Safety

9. INCIDENT SITE SAFETY

9.1 General Procedures

It is quite possible that the first persons to reach a civil or military aircraft crash site could be SAR/EMS personnel.

A key consideration at accident sites is that rescue personnel do not themselves become a casualty. In the heat of the moment and the desire to alleviate suffering and minimise causalities, individuals sometimes place themselves at considerable personal risk of injury or death. Cautious hast and an awareness of the hazards at accident sites, particularly aircraft accident sites will better prepare rescue personnel for the tasks at hand.

It is vital that accident sites, both civil and military, be appraised to detect hazards, which must be located and secured. Standard HAZMAT procedures should be adhered to.

Personnel working within 10 m of any ADF crash site should wear the following protective equipment:

Respiratory Protection: Wear National Institute of Occupational Safety and Health approved full-face or half-mask respirators with cartridges for organic vapours (for protection from jet fuel) and for dust, mist, and fumes (for airborne particulate fibres and other dust). All personnel must be fit, tested, and trained in the use of respirators. The use of full-face respirators will eliminate the need for goggles or safety glasses.

Eye Protection: Goggles or safety glasses with side shields shall be worn when a half-face respirator is used.

Skin Protection:

Coveralls - Tyvek, coated with 1.25mm polyethylene with hood. The coveralls should have a zipper front, elastic sleeves, legs, and drawstring hood.

Gloves - Puncture resistant leather gloves shall be worn. The environmental engineers will determine any additional requirements.

Boots - Steel toed shoes or boots should be worn.

All equipment should be thoroughly washed before removal.

9.2 Incident Site Hazards

Damage to modern aircraft can result in release of dangerous materials at an accident site, for example:

- Airborne synthetic products similar in nature to asbestos fibres.
- Toxic materials that may inadvertently be inhaled or affect the skin.
- Potentially explosive devices such as oxygen bottles.
- High-pressure tyres.
- Hydraulic accumulators and rocket deployed parachute systems.
- For military aircraft, rocket-powered or explosive cartridge powered ejection seats.
- Pyrotechnics and unexploded high explosive ordnance stores.
- Pathogenic (body) products.
- Radioactive materials.

Only those personnel essential to perform immediate actions to extricate survivors, the protection of the wreckage from destruction by fire or other causes, and the prevention of danger to other transport or the public should enter an accident site.

Aerospace vehicles may also be involved in an accident on Australian soil. These vehicles may vent dangerous gases for some time after landing and contain unfired retrorockets. A space vehicle may also contain a nuclear power source.

9.3 Rescue of Personnel from Crashed Aircraft

Without unnecessarily endangering yourself, rescue and care of survivors is the first priority at an aircraft site. If survivors appear to be in the aircraft and rescue seems possible, consider the following common-sense issues:

- Use care if approaching wreckage by vehicle, particularly if the approach is along the crash path, as survivors may have ejected or been ejected from the aircraft. Alternatively, if you are the first on the scene you may find no one else present. The occupants may have parachuted to safety or may have survived and left the scene to seek assistance.
- Approach the site from upwind (with the wind at your back) and downhill, if possible, to avoid inhalation of burning materials, some of which are toxic, others of which can be very irritating to the breathing tract. Look around the crash site, along the crash path, and maintain a clear observation of the accident site and associated hazards.
- Rescue personnel should wear appropriate PPE. Composite fibre splinters abound at an accident site where burning has taken place.
- Render first aid and care to survivors until relieved by medical personnel.
- Attempt to account for all occupants. Where the aircraft has disintegrated in flight, the wreckage, survivors and causalities may be scattered over a large area.
- Summon medical assistance if required and in due course, verify that this assistance has been sought. Consider shelter in-place for casualties as an alternative if accident site environment poses potential hazards.
- If there is evidence of a spreading post-accident fire or possible explosion from fuels or armaments, survivors should be removed to a safe distance from the scene; otherwise, DO NOT DISTURB THEM AS NECESSARY FOR FIRST AID. If the survivors require immediate evacuation to medical facilities, they should be decontaminated of hazardous materials prior to medivac if possible.

NOTE:

Military aviation life vests contain explosives and hazardous materials. They should be stowed in a safe location at the accident site.

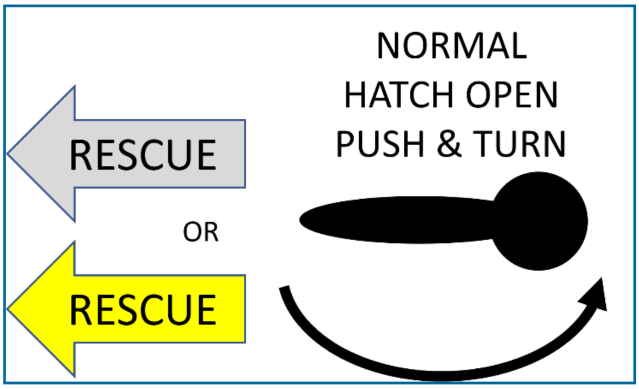
Stay clear of wing-mounted tanks, armament pods, landing gear oleos and pressure vessels (gas bottles). These assemblies can explode with devastating violence if fire is present. **DO NOT** disturb any armament thrown clear from military aircraft.

RAAF Hawk and the Super Hornet Jet aircraft have two ejection seats fitted. The turbo prop PC9/A trainer also has two ejection seats. These aircraft also usually have an in-built explosives system for emergency jettisoning of canopies.

Extreme care must be taken whenever ejection seats are observed to be amongst the wreckage and must be treated as **LIVE**. 'Safeing' of ejection seat-fitted aircraft is best left to trained personnel.

However, if an urgent requirement exists to unstrap and remove survivors from an aircraft, rescue crew must use utmost care and avoid interfering with items colour coded with yellow and black stripes.

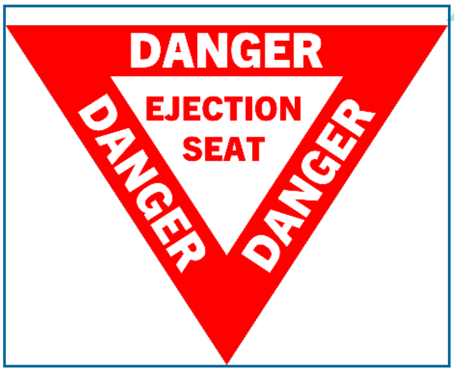
For the purpose of rescue, the location of access doors, hatches, break-in points and cut-out panels are indicated on the external surfaces of military aircraft by a yellow or grey arrow, bordered black as illustrated below. At access doors and hatches, the arrow will indicate the external controls with the operating instructions for the controls nearby.

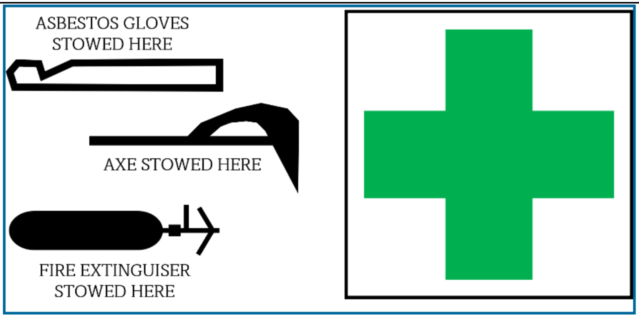


At break-in points and cut-out panels, an arrow will indicate an area delineated by a broken line (usually yellow). This area may be cut out to gain entry to an aircraft interior, should normal access doors be blocked or inoperative.

Caution needs to be exercised to avoid cutting devices igniting spilled fuel.

Systems requiring extra care in their operation or handling due to their containing an explosive device are indicated by a red or grey triangle. See example at right.

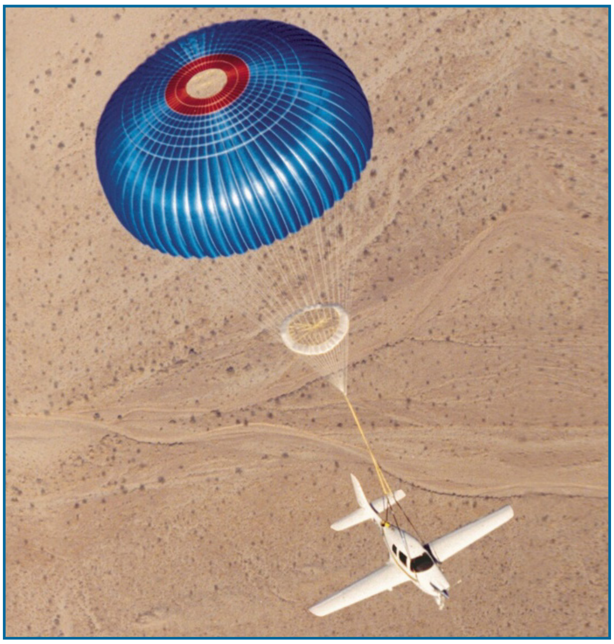




The position of any emergency equipment aircraft and accessible from the outside are indicated by a silhouette with an associated description. Where a first aid kit is carried, its marking will be found adjacent to an access panel or exit from which the kit is accessible.

Light Aircraft Ballistic Parachutes

Some civil general aviation aircraft types are fitted with rocket-deployed emergency recovery parachute systems. These parachute systems are designed to recover the aircraft and passengers to the ground should a serious in-flight emergency arise. The parachute rocket units contain explosives and are a hazard at an accident site if the system has not been activated.



Aircraft types known to be fitted with rocket-deployed emergency recovery parachute systems in Australia are the composite structured Cirrus Design SR20 and SR22, Pipistrel Virus and Sinus and the Sting TL-2000. These aircraft are fitted with rocket-deployed emergency recovery parachute systems at manufacture. Other types such as the Cessna 150/152, 172 and 182 series of aircraft can be retrofitted with BRS systems. There are currently about 100 different mounting installations for ultra-light and other types of aircraft such as hang gliders and gyrocopters listed by BRS.

A BRS unit is comprised of four major elements: Activation Handle, Activation Cable or Housing, Rocket Motor Assembly and Parachute Container.

BRS ACTIVATION HANDLE

The first thing emergency people may see is a red firing handle. This will be located near the seats, as it obviously must be close to the pilot. The red firing handle will connect to the activation housing, the flexible cable that links the firing handle to the igniter. In the picture below, see that each handle is secured with a safety pin. This is to remain with the handle until the aircraft departs for flight, at which time the pilot should then remove the pin. A first step for emergency personnel is to place some type of 3/16 inch pin or rod into the handle holder. This provides some measure of security

IMPORTANT:

Miss-identification or miss handling of these devices could prove fatal.

PARACHUTE CONTAINER

Rescue personnel should first determine the existence of a ballistic parachute unit. You can scan for a company logo, often placed on the outside of the aircraft. Alternatively, you can look for the unit itself. The container, which holds the parachute canopy, will always have a company logo on it, and it's the largest component. If possible, locate the parachute container, rocket, activation cable (housing) assembly and activation handle.

The parachute may be housed in a fabric covering called a soft pack, in a fibreglass box called a VLS (vertical launch system), or a white aluminium canister.

Each of the various container types may be mounted in a variety of locations, according to aircraft design.

The activation housing, again, joins the firing handle on one end to the rocket motor on the other. Pulling either end away from one another can fire the unit. Normally, the handle and the parachute unit will be mounted securely, but as stated above, in an accident, orientation may change. Rescue personnel, police officers, and fire fighters should initially exercise extreme care when working around these systems, especially if the airplane is severely broken up or the activation cable appears to be tightly stretched.

ROCKET MOTOR

If the airframe has experienced significant break up, there is a very good chance that the rocket motor has been initiated. Tell-tale signs of this would be:

- The parachute canopy extracted from its container.
- The rocket motor no longer in the launch tube.
- A burned appearance on the lanyards joining the rocket motor to the parachute.
- Being unable to locate the rocket motor at all.

A rocket motor that has separated from the igniter poses no significant hazard, unless it is exposed to fire. Experience has shown that a rocket motor subjected to high temperatures (fire) will not ignite in a normal manner and launch. Rather, they have been observed to burst in a relatively non-threatening display.

After a determination is made that the rocket is live, under no circumstances should rescue personnel place any part of their person in front of the launch tube. Clear a 90-degree area in front of the rocket motor, extending 30 m out, if possible.

Aircraft accident sites are often contaminated with flammable materials and with flammable liquids such as petroleum products following the destruction of aircraft integral fuel tanks in wings and fuselages. Due to the possibility of causing a fire, rescue organisations, police and investigators need to be vigilant about the type of equipment used on site, including the use of mobile telephones and flash-proof torches.

Any inadvertent activation of a ballistic parachute rocket could present a direct ignition source for these materials and liquids and could be hazardous for on-site personnel and accident survivors. Personnel attending an accident involving an aircraft fitted with a rocket-deployed emergency recovery parachute system fitted to it should always act appropriately to ensure their own safety.

This may mean leaving the aircraft on site and cordoning it off until appropriate personnel arrive. Some agencies take a very conservative position regarding how best to handle an unfired rocket. They feel that this is work best left to the local bomb squad. We leave such decisions entirely up to the individuals in charge at the scene.

Fuel Hazards

A primary hazard in a post-crash aircraft fire is the presence of aircraft fuels, which, if ignited, pose considerable danger to survivors, rescue personnel, fire services personnel, etc. Fuel used by aircraft will come from one of the following groups:

Avgas is a high-octane aviation petrol suited for piston-engine aircraft.

It has a relatively low flash point and therefore highly flammable/volatile. Avgas is used in civil general aviation aircraft and military Caribou transport aircraft.

Avtur is the kerosene-type fuel used in all jet or turboprop aircraft and does not possess the low flash-point qualities of Avgas. However, when heated its flash point is reduced significantly. This fuel burns longer and more intensely than Avgas.

Diesel is also in use in some GA aircraft and has similar characteristics to Avtur.

Water Methanol is used in small quantities to provide extra power and as an additive to Avtur in certain flight situations, such as take-off. This substance is alcohol-based and burns without a visible flame. If ignited during a crash, problems are likely to be encountered with extinguishment, as alcohol foam would need to be used.

Materials Used in Aircraft Construction Hazards

Materials used in aircraft construction, if subjected to intense heat, can produce hazardous situations or develop toxic side effects.

Magnesium and Aluminium Metals in various mixtures are used extensively as structural components, particularly where lightweight framing is used. In some aircraft magnesium is used in wheel assemblies. It is also used in pyrotechnics; it burns with intense heat and radiates powerful light. Water should not be applied as an extinguishing agent to burning magnesium as an explosion may occur.

Other hazardous metals such as **cadmium, depleted uranium**, and **beryllium**, are used in small quantities and can be extremely toxic when exposed to fire.

Composite Materials (such as carbon fibre in an epoxy resin) are used extensively in modern aircraft. When involved in a fire, these materials may give off toxic fumes and loose fibres may be released in the smoke plume. It is possible, but not highly probable, that loose fibres may cause short-circuiting of electronics and electrical equipment. The major hazard, however, is from inhalation and ingestion of free fibres and associated burning resin products.

Only personnel equipped with selfcontained breathing apparatus or full-face canister respirators with appropriate cartridges should enter the accident site until all fires are extinguished and loose composite fibres are suppressed (eg, bonded with spray-on floor polish or similar product sprayed over the fibres).

Toxic Gases are also given off when some plastics and adhesives are burnt. After the fires have been extinguished, loose fi bres should be avoided. Bear in mind that some materials used in aircraft construction may be rendered harmful after heating in a fire and then being extinguished with water. Their products may be strongly acidic (eg, fluoro polymers which yield hydrofluoric acid), or dangerous to ingest (eg, some magnesium alloys or depleted uranium which corrodes very rapidly in the presence of water).

It is imperative that all personnel at the accident site wash all exposed areas of skin before eating, drinking or smoking. Should emergency services personnel at the site exhibit respiratory distress or skin irritation, they should evacuate the site and institute **HAZMAT** (hazardous material) procedures for liquid hazards.

High pressure Containers are used in some aircraft systems. These containers when subjected to heat may be the source of secondary explosions. Pressurised containers likely to be encountered may consist of oxygen, liquid nitrogen, hydraulic accumulators, landing gear struts and fire extinguisher bottles (fixed and hand-held).

Dangerous / Hazardous Cargo and small amounts of radioactive material may be present or scattered on the accident site. Radioactive materials are used in numerous areas of military aircraft and missile guidance systems.

Aircraft Flight Recorders

Flight recorders provide vital, but perishable, evidence of the last moments of a flight. Unless authorised by Australian Transport Safety Bureau (ATSB) or DFS-ADF investigators, these units are not to be removed or accessed.

Post Mortem Matters

Deceased persons should not be moved until a specialist doctor (or other competent medical authority with aviation medical experience) has examined them and should only be moved under police supervision. On no account should clothing or safety equipment be removed from the deceased before specialist medical examination and recording.

To prevent undue spread of contaminants, whenever practical all items should be decontaminated of hazardous materials prior to removal from the accident site. Human remains are to be handled and transported in accordance with standard coronial procedures.

9.4 Site Safety

The prevention of unauthorised persons entering an accident site is based on common sense:

- Respect for causalities.
- Protection of valuable, important or classified equipment.
- The preservation of evidence to establish the factors that contributed to the accident; and
- The prevention of unnecessary exposure to hazards.

IMPORTANT:

All accident sites must be secured to prevent unauthorised persons from entering the area

The media and insurance representatives have a job to do and deserve access to certain information in order to do that job. However, if these representatives arrive before ATSB or military authorities, for their own safety, they must remain outside the secured area.

Photographs by the media of survivors or deceased persons are not permitted. Care should be exercised in the use of mobile telephones or radios to discuss the accident, or the personnel involved, as the media may be capable of monitoring communications frequencies. The news media are also to be prevented from flying over or hovering over an accident site.

Typical Crash Site

9.5 Site Investigation

9.5.1 Roles of the ATSB and the Defence Organisation

Civil

Under current Commonwealth legislation and in conformity with international agreements, the ATSB is the body responsible for investigating civil aviation accidents and incidents. The ATSB is an operationally independent Bureau within the Commonwealth Department of Transport and Regional Services (DOTARS). The ATSB has its head office in Canberra and regional offices in Perth and Brisbane.

In general, the ATSB does not investigate sports aviation accidents. The ATSB will inform the appropriate sporting body and the police that the ATSB is not investigating. The police will normally coordinate the accident investigation. Consequently, the ATSB will not attend the scene or conduct an investigation.

Military

The Minister of Defence has established the Directorate of Flying safety – Australian Defence Force (DFS-ADF) operating under the authority and guidance of the Chief of Air Force (CAF). DFS-ADF has responsibilities for investigating Australian or foreign military aircraft accidents in Australia.

DSF-ADF maintains a 24-hour rapid response Aircraft Accident Investigation Team (AAIT). All military bases from which aviation activities take place maintain qualified personnel available to assist at accident sites.

9.6 Site Preservation

To minimise risk of fire or further fires, rescue crews should establish a **NO-SMOKING** zone around the accident site. Volatile/flammable materials may have been scattered over a wide area. If evacuation from homes in the accident area is necessary, make every effort to do so without undue alarm. Panic can cause unnecessary injury to innocent parties.

To prevent the inadvertent ingestion of harmful materials, including biological hazards, a **NO EATING** zone should be established around the accident site. Bystanders must be kept well clear of the accident site and wreckage and upwind if possible.

Many modern aircraft systems include computer technology containing information that may be vital to the investigation. It is therefore important to preserve information contained on computer `chips'. These chips can be sensitive to heat, shock, and electronic fields. If possible, please be careful when moving wreckage to perform any immediate actions required, such as the prevention of danger, preserving life or removing victims. If possible, this material is not to be moved until an ATSB Transport Safety Investigator or DFS-ADF Accident Investigation Team member can provide technical advice. It is realised, however, that care and respect towards the victims of an accident have immediate priority and this may make it difficult to preserve some evidence.

9.7 Helicopter Operations

Do not winch rescuers directly down onto the crash site. Downwash from the rotors will blow hazardous and possibly still smouldering materials about and disturb the site. Rescuers should be winched a safe distance from the site and walk in. Protective measures should be taken by any personnel approaching a crash site.

9.8 Marine Pollution Response Operations

As with aircraft crash sites on land, fixed wing aircraft operating in a marine Pollution Response operation over water should maintain a safe orbiting radius as vapours from a spill could pose a danger to aircraft crews.

Services Other Than SAR

10.SERVICES OTHER THAN SAR

10.1 General Procedures

ARC performs operations other than search and rescue, which, if not carried out, could result in a SAR incident. These operations include:

- Assisting a vessel or aircraft that is in a serious situation and in danger of becoming a casualty, thereby endangering persons on board. This assistance may be by way of direct action, or by way of notification to, and coordination with, other SAR authorities.
- Broadcasting Maritime Safety Information (MSI).
- Alerting appropriate authorities of unlawful acts being committed against an aircraft or ship.
- Alerting appropriate authorities after a ship or aircraft has been abandoned, to minimise future hazards; and
- Providing an active SAR Watch to vessels through the Australian Ship Reporting System (AUSREP).

Safety Information

Maritime Safety Information (MSI), such as warnings of hazards to navigation, is promulgated by the ARC and broadcast through the Inmarsat SafetyNET, Iridium GMDSS, and some Limited Coast Radio Stations (LCRS). Broadcast of MSI serves to assist with preventing SAR incidents from occurring. This service is provided by the ARC throughout Australia's region and NAVAREA 'X'.

10.2 AMSA Marine Pollution Response Operations

AMSA carries Commonwealth responsibility for combating pollution and enforcing waste discharge standards for ships and is required to perform its functions in accordance with international agreements.

As a signatory to a number of international conventions relating to pollution of the sea, Australia has legislated to implement its responsibilities. These include informing flag states when their ships on the high seas infringe the conditions of a convention.

The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) sets standards for operational discharges and construction of ships to minimise the risk of pollution. MARPOL 73/78 prohibits operational discharges in the Great Barrier Reef area and is the most important convention in the global control of pollution from ships, with acceptance by over 120 countries representing some 97% of world merchant shipping tonnage.

MPR tasks usually relate to spills of petroleum products or hazardous chemicals in the maritime environment. The support for MPR tasks is supplemental to the primary search and rescue role of the services to be provided to AMSA but may at times also be a nominal primary role if the situation dictates.

MPR tasks are broadly separated to three distinct activities: Spill Detection, Spill Investigation, and Spill Response. There is no particular order to these tasks although, generally, Spill Response and Investigation will follow Spill Detection. Each of these tasks may be described as follows:

Spill Detection

A strategic role where maritime areas are targeted for surveillance (electronic or visual) for potential pollution rather than an actual or reported pollution. Such tasks are planned in advance and generally follow a set of waypoints, similar to a BPC surveillance task, such as a patrol of the Bass Straight area. A Spill Detection tasks may evolve to a Spill Response or Spill Investigation task.

Spill Investigation

Spill Investigation task may be initiated when there is a credible report of pollution in an area, or as a result of a surveillance task that has detected a spill of some type. This task is generally aimed at evidence gathering (for a possible prosecution) or intelligence gathering (for a possible response action to the spill). Spill Investigation will involve stringent requirements for the gathering and handling of evidence material.

Spill Response

Spill Response is very much a tactical role aimed very much at containing or cleaning up a spill of some type. Spill Response may include, singularly or in combination, the roles of:

- Observation,
- Equipment Dropping, and
- Command and Control.

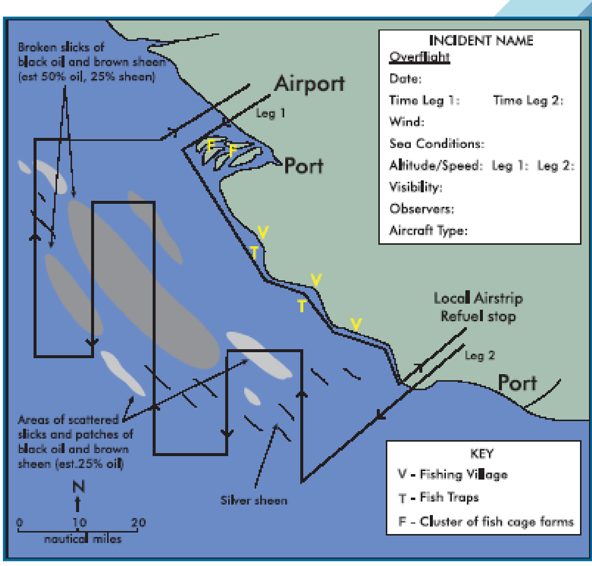
Observation (visual or electronic)

Aerial reconnaissance is an essential element of effective response to marine oil spills. It is used for assessing the location and extent of oil contamination and verifying predictions of the movement and fate of oil slicks at sea. Aerial surveillance provides information facilitating deployment and control of operations at sea; the timely protection of sites along threatened coastlines and the preparation of resources for shoreline clean up. Observation can be undertaken visually or by use of remote sensing systems.

Visual observation of floating oil from the air is the simplest method of determining the location and scale of an oil spill. However, obtaining worthwhile results requires detailed preparation before take-off and careful interpretation of the information gathered. Surveillance of spilled oil can be undertaken by helicopter, particularly over near-shore waters where their flexibility is an advantage along intricate coastline with cliffs, coves and islands.

Over the open sea, there is less need for rapid changes in flying speed, direction and altitude, and the speed and range of fixed-wing aircraft are more advantageous.

In view of the errors inherent in oil movement forecasting, it is usually necessary to plan a systematic aerial search to ascertain the presence or absence of oil over a large sea area. A 'modified parallel search' is frequently the most economical method of surveying an area When planning a search, due attention must be paid to visibility and altitude, the likely flight duration and fuel availability, together with any other advice the pilot may give.



Floating oil has a tendency to become elongated and aligned parallel to the direction of the wind in long and narrow 'windrows' typically 30 - 50 m apart. It is advisable to arrange a ladder search across the direction of the prevailing wind to increase the chances of oil detection.

Other considerations are haze and light reflection off the sea, which often affects visibility of the oil. Spotting oil is often easiest with the sun behind the observer, and it may prove more profitable to fly a search pattern in a different direction to the one originally planned. Sunglasses with polarising lenses can assist the detection of oil at sea under certain light conditions. Despite making careful predictions and planning a systematic ladder search, the actual pollution observed during the flight may still be different to the situation envisaged. It is important therefore, for contingencies to be borne in mind and adjustments made during the flight, to maximise the chances of finding the oil and plotting its full extent, while still trying to maintain a logical and efficient flight plan.

The search altitude is generally determined by the visibility. Over open sea areas, in clear weather 1000-1500 ft (300-450 m) frequently proves to be optimal for maximising the scanned area without losing visual clarity. However, it is necessary to drop to half this height or lower in order to confirm any sightings of floating oil or to analyse its appearance. For helicopters, when used closer to shore, and in the absence of any restrictions imposed by the pilot or by the nature of the coastline to be surveyed, a flight speed of 80-90 kts and an altitude of 400 - 500 ft (120-150 m) often proves a useful starting point. Further adjustment may then be made as appropriate during the course of the flight.

It is essential that observers can keep track of the position of the aircraft, so that progress may be monitored along with any changes that might be necessary in the light of the circumstances noted during the flight. Features and landmarks along the coast may be compared against charts when surveying a shoreline but over open water, away from any obvious reference points, it is easy to become disorientated. Ideally, an observer will have the opportunity of consulting the aircraft instrumentation in order to ascertain speed, direction and position, but in such an event, it is worth ensuring beforehand that reading these instruments will present no difficulty.

Crude and fuel oils spilt at sea undergo marked changes in appearance over time as a result of 'weathering' processes. It is important for observers to be familiar with these processes so that the presence of spilled oil can be reliably detected and its nature accurately reported.

Most oils spread rapidly over wide areas of the sea surface. Although the oil may initially form a continuous slick this usually breaks up into fragments and windrows due to circulation currents and turbulence. As the oil spreads and the oil thickness reduces, its appearance changes from the black or dark brown colouration of thick oil patches to iridescent and silver sheen at the edges of the slick.

Sheens consist of very thin films of oil, and whilst these areas can be widespread, they represent a negligible quantity of oil. In contrast, some crude oils and heavy fuel oils are exceptionally viscous and tend not to spread much but remain in rounded patches surrounded by little or no sheen. A common feature of spills of crude oil and some heavy fuel oils is the rapid formation of water-in-oil emulsions ('mousse'), which are often characterised by a brown/orange colouration and a cohesive appearance.

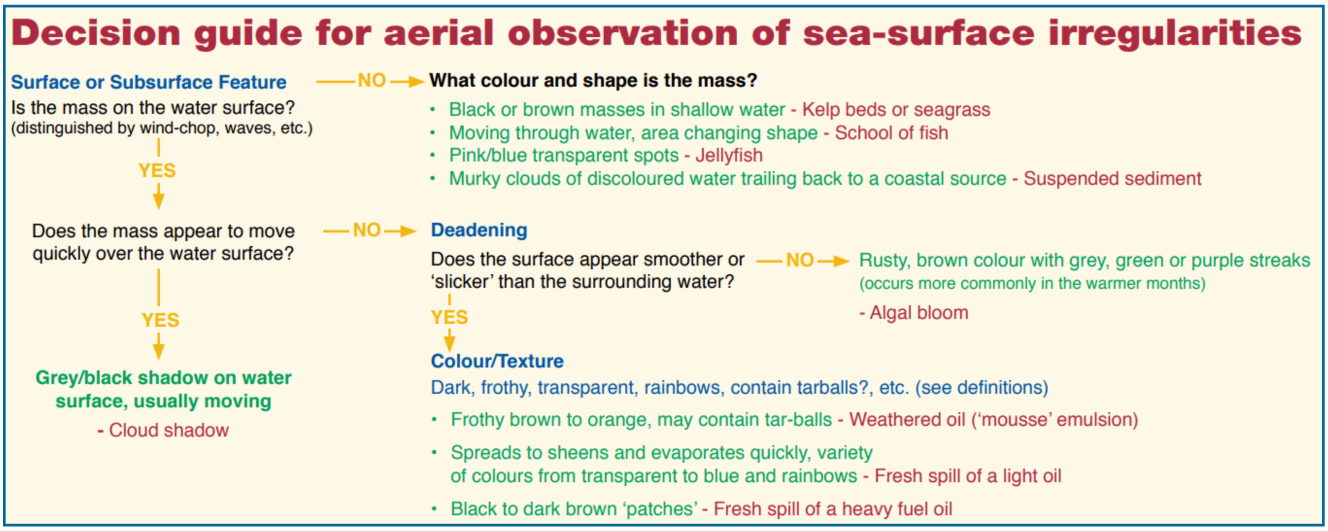
10.2.1 Identifying Oil.

From the air, it is notoriously difficult to distinguish between oil and a variety of other unrelated phenomena. It is necessary therefore to verify initial sightings of suspected oil by over flying the area at a sufficiently low altitude to allow positive identification. Aerial observations of shoreline oiling should be confirmed by a closer inspection from a boat or on foot.

Phenomena that most often lead to mistaken reports of oil include:

- Cloud shadows.
- Ripples on the sea surface.
- Differences in the colour of two adjacent water masses.
- Suspended sediments.
- Floating or suspended organic matter.
- Floating seaweed.
- Algal/plankton blooms.
- Sea grass and coral patches in shallow water; and
- Sewage and industrial discharges.

A particularly difficult task is to distinguish between operational tank washings from passing vessels and oil originating from an accidental spill. The smaller quantity and coverage of tank washings and their linear distribution are usually indicative.

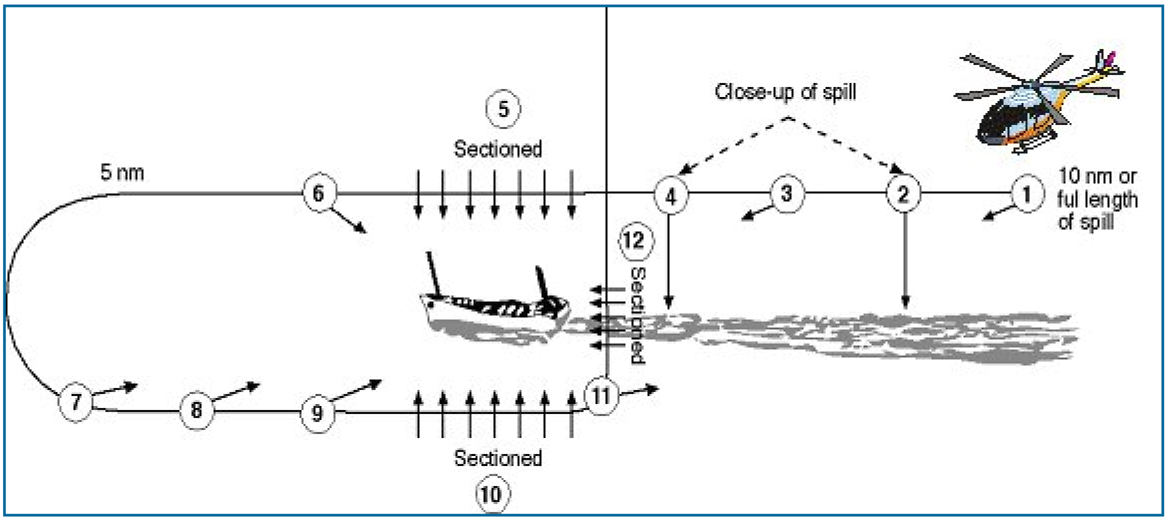


10.2.2 Information Recording

The nature of the information collected and the way it needs to be recorded and presented will vary depending on the scale of the pollution problem and the level of detail needed to meet the intended purpose of the surveillance flight. The main features that should be recorded are provided in the figure below. Working sketches and annotations will need to be worked up either by hand or with the aid of a computer, to produce a final map for presentation. It is good practice to retain the original sketches and notes in case they may need to be referred to again later.

DIGITAL PHOTOGRAPHS

Digital photographs can also provide a useful record of oil pollution. Whenever possible, features such as ships and the coastline should be included to give an idea of scale.



Description of Photograph Positions

(1)	Long distance view of full length of slick emanating from vessel's stern Minimum 10nm or full length of spill if longer
(2) (4)	A close-up of slick to show colours and thickness of oil
(3)	Approaching shot of vessel stern, clearly showing oil discharging from vessel, and long Identification of vessel
(5) (10)	Sectioned shots along the side of the vessel. May show discharge or activity on-board
(6) (9)	Forward shot of bow of vessel
(7) (8)	Long distance view of clean water in front of vessel and showing slick extending from stern
(11)	View of slick extending from stern of vessel
(12)	Sectioned shots across stern to positively identify vessel

Photograph Altitude

(1) To (6)	1000ft	VMC & Conditions Permitting
(7) to (12)	500ft	VMC & Conditions Permitting

Long distance view of no oil in front of vessel and showing slick extending from vessel stern.

Approaching shot of vessel stern, clearly showing discharge and identification of ship name if possible.

Close up shot of hull including vessel name if possible.

Forward photograph of bow of vessel showing no oil ahead of vessel.

Shot of vessel showing slick behind the ship and within its track.

Shot of vessel showing discharge trailing the vessel.

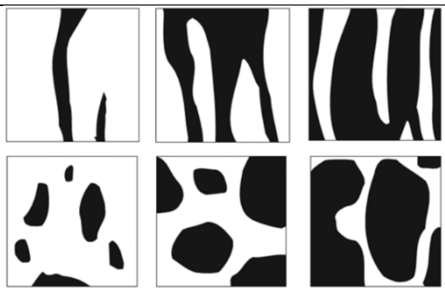
Sectioned photographs along side of the vessel. May show discharge or activity on board.

Other Photographic Details

Relatively high sensitivity films and fast shutter speeds (1/500th second) are recommended to avoid blurring from the motion and vibration of the aircraft. UV and polarising filters are often useful to cut down glare and can sometimes assist in sharpening the visual definition of oil on the water, although some polarizing filters produce colour distortions through aircraft windows made of plastics. A log of the photographs taken should be retained for referencing purposes. Using a digital camera can speed up the process of disseminating images to a wide audience.

Video cameras can provide an additional tool for recording observations, but filming may prove difficult in turbulence and during aircraft manoeuvring. The use of hand-held cameras is also constrained by the limited field of view through the eyepiece, which reduces the ability of the observer to quickly scan the sea surface.

Information Recording.

Feature	Data	Comment
Location and extent	• Latitude and longitude (preferably by GPS) for location of slicks • GPS readings for centre or edges of large slicks • Visual estimates for dimensions of smaller slicks and patches	It is important to retain a sense of scale so that what is observed on the water is not exaggerated when being recorded. It is worth establishing a mental picture of distance on the outward leg of a light by observing and noting recognisable land features. When observing large areas affected by oil, the presence of any ships is useful in gauging the scale of slicks. Regular reference to GPS readings is useful to confirm estimates made visually
Colour	• For oil slicks: Black, Brown, Orange • For sheen: Silver, iridescent (rainbow), Brown	Colour offers an important indication of oil thickness. For oil slicks, a brown or orange colour indicates likely presence of water-in-oil emulsion. In terms of oil spill response, sheen may be disregarded as it represents a negligible quantity of oil cannot be recovered or otherwise dealt with to any significant degree by existing response techniques and is likely to dissipate readily and naturally. Depending on the circumstances, sheen may often be omitted therefore from the final report prepared after the flight
Character	• Windrow, Slick, Patch, Streak	Observers should avoid too many descriptive phrases and should apply their selected terms consistently throughout.
Features	• Leading Edge	If the thick of characterising the leading edge of a slick can be identified, it should be denoted by a heavier line on the plan and referenced.
Coverage	 25% 50% 75%	For response efforts to be focussed on the most significant areas of oil pollution, it is important to have information on the relative and heaviest concentrations. To avoid distorted views, it is necessary to look vertically down on the oil when assessing the distribution. It is difficult to make an accurate assessment of the % coverage and it is advisable no to try to be too precise with the estimation. The diagrams may be used as a reference guide. More experienced observers may be able to interpolate intermediate coverages.

The adoption of common terms can also provide an indication of the amount of oil present in a given area. In combination, the estimate of coverage together with selected terms, provides a consistent and flexible method of describing the amount of oil in an area to a degree of accuracy sufficient for response decisions to be made

Traces	Scattered	Patchy	Broken	Continuou
<10%	25%	50%	75%	>90%

An additional observer for video recording is therefore preferable. Down links may allow information to be passed automatically to the ground and allow replays. Hand-held video cameras allow the addition of commentary, which if not added in sufficient detail with suitable location references, may make later co-ordination of the video with other observations difficult - especially if extended footage has been produced. Video footage is best used to supplement rather than replace briefings made by experienced observers.

It is hard to assess accurately the quantity of oil observed at sea, due to difficulties of gauging thickness and coverage. However, by considering certain factors it may be possible to assess the correct order of magnitude of the spill, which may help with planning the required scale of clean-up response. Because of the uncertainties involved, all such estimates should be viewed with considerable caution.

Oils with a low viscosity spread very rapidly and so oil layers quickly reach an average thickness of about 0.1 mm.

However, the thickness of the oil layer can vary considerably within a slick or patch of oil from less than 0.001mm to more than 1mm. For more viscous oils, the oil thickness may remain well in excess of 0.1mm. The appearance of the oil can give some indication of its thickness.

Oil Type	Appearance	Approximate Thickness	Approximate Volume (m^3/km^2)
Oil Sheen	Silver	>0.0001 mm	0.1
Oil Sheen	Iridescent (rainbow)	>0.0003 mm	0.3
Crude and Fuel Oil	Brown to Black	>0.1 mm	100
Water-in-oil Emulsions	Brown/Orange	>1 mm	1000

Relationship between the appearance, thickness and volume of floating oil

Some oils form an emulsion, or mousse, by the inclusion of tiny droplets of water, which increases their volume. A reliable estimate of the water content is not possible without laboratory analysis, but figures of 50-75% are typical. The thickness of mousse can vary considerably depending on the oil type, the sea conditions and whether the mouse is free-floating or held against a barrier such as a boom or the shoreline. A figure of 1mm may be used as a guide, but thicknesses of 1cm and more can sometimes be encountered and it should be emphasised that the thickness of 'mousse' and other viscous oils is particularly difficult to gauge because of their limited spreading.

When the sea surface is rough, it can also be difficult or impossible to see less buoyant oil types as they can be swamped by waves and remain just sub-surface. In cold water, some oils with high pour points will solidify into unpredictable shapes and the appearance of the floating portions may disguise the total volume of oil present. The presence of ice flows and snow in such conditions will confuse the picture yet further. In order to estimate the amount of floating oil it is necessary not only to gauge thickness, but also to determine the surface area of the various types of oil pollution observed

Due account needs to be taken of the patchy incidence of floating oil so that an estimate may be made of the actual area of coverage relative to the total sea area affected. The extent of the affected sea areas needs to be determined during the flight. The GPS will enable the limits of the main areas to be recorded relatively easily and accurately. If GPS equipment is not available, the extent of oil must be established by a timed over flight at constant speed.

10.2.3 Equipment dropping

An SLDMB can be deployed by a helicopter to monitor water movement, or sampling equipment may be deployed to sample the pollution material.

10.2.4 Command and Control

The SAR aircraft may provide support to a clean-up operation and perform functions of top cover, on-scene coordination, and communications relay (although not as separate and specific roles).

Spill Detection and Spill Response tasks can be undertaken by any of the RW search or rescue aircraft.

10.2.5 Marine Pollution Response Tasking

Apart from planned surveillance tasks, the circumstances for tasking RW SAR aircraft for an MPR task will depend on the evidence available at the time. Each potential MPR task will be treated on a case-by-case basis to determine if a call-out of an aircraft is warranted. Other assets may be available to firstly determine if, for example, a reported pollution is legitimate or requires further response.

Where it is determined that call-out of an aircraft is appropriate, the ARC will be advised of the task requirement (including a description of the task, location of the report or incident, proposed search pattern and search method. An MPR representative may be requested to join the aircraft. Depending on the situation, the AMSA Maritime Standards Division (MSD) duty officer may join the ARC to provide task oversight.

A Spill Response task will generally require an MPR representative to participate on board the aircraft, and the AMSA MSD Duty Officer will join the ARC to provide oversight. Such a task may also involve relocation of the aircraft for a period of time.

10.2.6 Reports

For Spill Detection and Spill Investigation tasks, a Pollution Detection Report will be required in near real time, as a minimum, by message to the ARC, and by voice for a significant event. The Pollution Detection Report is to include the following data items:

- DTG.
- Location of event (lat/long).
- Area of pollution (size, shape, pattern).
- Environment conditions (wind speed and direction, sea conditions).
- Any land or reef relationship.
- Estimated drift.
- Vessel (if involved) with:
  - Name.
  - Nationality / POR / Flag.
  - Hull type.
  - Colour/description.
  - Direction and speed.
  - Colour (of slick).

10.2.7 Post Mission Reports

On completion of an MPR mission, a post mission debrief report is to be compiled and forwarded to the ARC within one hour of landing.

For a Spill Investigation task, evidence gathered must be handled strictly in accordance with AMSA evidence data handling procedures.

For a Spill Response task, communications and reporting will be predominantly by voice followed up by the post mission debrief report.

10.3 Intercept and Escort Operations

The main purpose of intercept and escort operations are to minimise the delay in reaching the scene of distress and to eliminate a possible search for survivors. Escort service for both aircraft and vessels will normally be provided to the nearest adequate aerodrome or nearest safe haven for vessels (safe mooring and with a means of communications such as a telephone). Escorts can also often provide various types of assistance should the escorted craft be unable to arrive at a safe place under its own power.

The following assistance can be provided by an escort aircraft:

- Moral support to the persons on board the distressed craft, assuring them that assistance is immediately available.
- Navigation and communication functions for the distressed craft, permitting its crew to concentrate on coping with the emergency.
- Inspection of the exterior of the distressed craft.
- Advice on procedures for aircraft ditching, including ditching heading, or for abandoning or beaching a vessel.
- Illumination during aircraft ditching or vessel abandonment, or assistance in the approach procedure at the destination.
- Immediate provision of emergency and survival equipment, if any, carried by the escort facility; and
- Direction of rescue facilities to the distress scene.

In an Uncertainty Phase, the SMC may alert SAR facilities capable of providing an escort facility. If the incident progresses to an Alert or Distress Phase, the SMC may then dispatch the escort facility immediately. Even when it appears too late for the intercepting facility to affect the intercept, it should be dispatched to begin the search.

An aircraft may be considered to need an escort when:

- Navigation or radio equipment is suspect.
- It is unable to maintain altitude.
- It has suffered structural damage.
- It is on fire or fire is suspected.
- The pilot’s control of the aircraft is impaired.
- Remaining fuel is suspected to be insufficient.
- Fewer than three out of four, or fewer than two out of three engines are operating normally: or
- It is threatened by any other grave and imminent danger.

A ship may be considered to need an escort when:

- Its stability is endangered (e.g., taking in water or cargo shifting).
- It has suffered actual or suspected structural damage.
- It is on fire or fire is suspected.
- The master's control of the vessel is impaired.
- Remaining fuel is suspected to be insufficient.
- Its steering gear is defective; or
- It is threatened by any other grave and imminent danger.

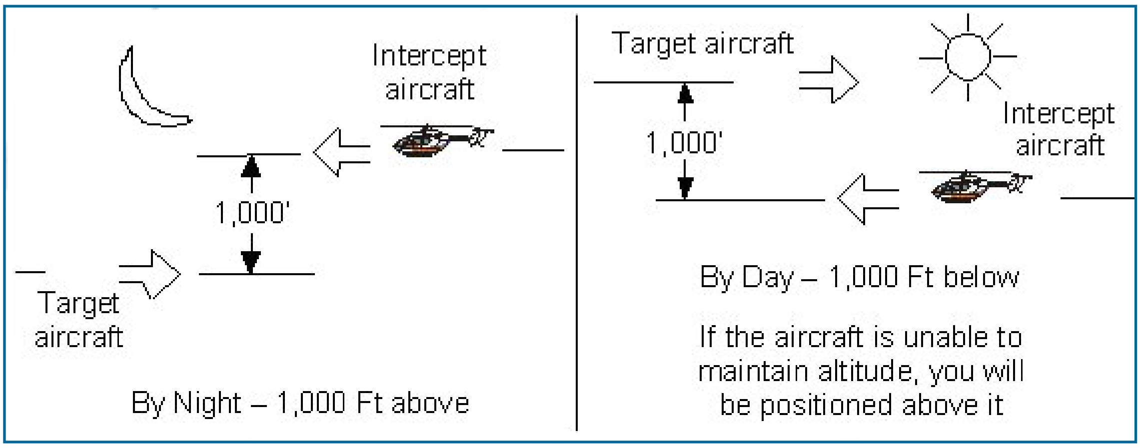
The following information regarding the distressed craft should be given to the intercepting facility:

- Description, including call sign and other identification marks.
- Position at a specified time and type of navigation aids used.
- Heading and drift (or track).
- Speed over the ground or water.
- If an aircraft, whether it is maintaining altitude, climbing, or descending.
- Number of persons at risk; and
- Brief description of the emergency.

10.3.1 Intercept

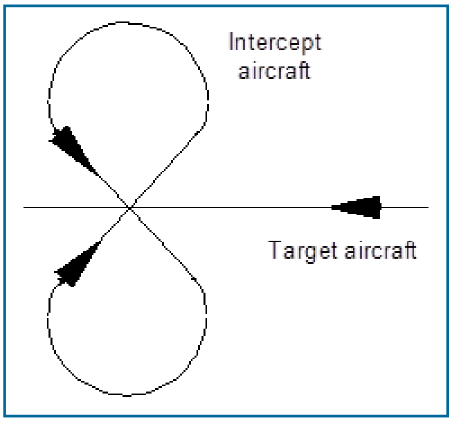
Accurate navigation by both the distressed craft and the intercepting facility is the most important factor when affecting an intercept. When visual contact has been made, the intercepting aircraft will normally take up a position slightly above, behind and to the left of the distressed craft.

Intercepting Altitudes



Holding Pattern for Escort

Fly to the nominated intercept point and hold until the distressed aircraft arrives. Hold using Figure 8 patterns across the track. Make turns towards the direction of the distressed aircraft, as shown in the figure at right.



10.4 Assistance to Property Operations

The primary concern of SAR operations is assistance to persons in distress. However, Chapter 5 of the '*International Aeronautical and Maritime Search and Rescue Manual on Organization and Management*' points out some factors and reasons for consideration of saving property. Variations of the terms "saving", and "salving" are commonly used internationally regarding removal of property from risk. Commercial salvage companies may become involved during or after SAR operations.

SAR personnel on-scene are usually in the best position to assess what actions are necessary to minimize future hazards such as pollution from cargo or fuel spills and ships becoming hazards to navigation. Action such as towing or temporary repairs by the SAR facility may be able to prevent the occurrence of more complicated problems at a later stage.

However, SAR facilities typically are not experts in salvage operations, so the SMC must consider their capabilities and the risks to them. Judgments about the stability of a damaged vessel, or whether freeing a grounded vessel will improve or worsen the situation, can be very difficult to make.

When a salvage vessel is at the scene of the distress or en-route to it, the SRU involved should verify whether the salvage vessel is prepared to affect salvage, and whether this assistance is acceptable to the distressed craft. If not, the SRU should render assistance as necessary to ensure the safety of life.

10.5 Emergency Towage Vessel (ETV) Operations

AMSA operates one dedicated Emergency Towage Vessel (ETV) in the particularly sensitive sea areas of the northern Great Barrier Reef (GBR) and Torres Strait. The ETV is equipped with a medical facility. It is not possible for a helicopter to land on the vessel, but the crew undergo regular training in helicopter operations including winching, external load and stretcher operations. The ETV forms part of the National Maritime Emergency Response Arrangement (NMERA).

The NMERA provides a minimum level of emergency towage capability in strategic regions around the Australian coastline and a regulatory framework to support a coordinated approach to emergency response issues.

The strategic regions are judged to be a higher risk from environmental damage as a result of transiting vessels being involved in groundings or other maritime casualties/incidents.

10.5.1 Location and Operational Control

The ETV is based in Cairns and operates from the Cairns region to north and in the Torres Strait.

The ETV is under the operational control of the ETV, and is available for the use of AMSA, State and Northern Territory marine authorities, and commercial interests.

The operational role of the ETV includes, but is not limited to:

- Initial response emergency towage capability in the event of a maritime casualty occurring on the inner route of the Great Barrier Reef and Torres Strait.
- Initial response maritime pollution capability (utilising the limited equipment it has on board).
- Initial response SAR capability.
- The potential to provide emergency towage assistance in the event of a maritime casualty on the outer route of the GBR.
- Passive ship escort duties; and
- Shipping platform for Aids to Navigation (AtoN).

An initial response capability may be necessary during a maritime incident/casualty that includes:

- Preserving life.
- Protecting the marine environment from pollution.
- Firefighting (if able).
- Towing a vessel out of immediate danger.
- Stabilising a casualty to prevent further damage to the ship or the environment; and
- Towing or escorting a casualty to a place of refuge (as opposed to a place of repair).

10.5.2 SAR Incidents

If the ETV is required for a SAR incident, the ETV Manager may transfer coordination to the ARC.

Should the master of the ETV become aware of a SAR incident before the ETV Manager or the ARC, and the master considers that assistance may be required, full incident details are to be provided to the ETV Manager through the ARC.

The vessel should then proceed in accordance with the requirements of SOLAS and the Navigation Act, under the coordination of the ARC. Nevertheless, the ETV Manager retains operational control and, following consultation with the ARC, may direct that the vessel responds otherwise.

Should there be two or more incidents occurring at the same time to which the ETV can proceed to assist, the ETV Manager will decide which incident has priority.

SAR in PNG Territorial Waters

Where the ETV Manager has agreed for the ETV to participate in a SAR incident in PNG waters, the ARC will coordinate the response and liaise with PNG authorities in accordance with relevant international SAR arrangements and Australia/PNG SAR Arrangement.

Marine Casualty and Pollution Response

The ETV is equipped with a range of equipment to enable it to respond to an environmental threat within its operational area.

The decision as to the ETV's utilisation during an environmental protection incident will be made by the ETV Manager, in accordance with NATPLAN procedures.

SRU Training and Audits

11. SRU TRAINING AND AUDITS

11.1 General Procedures

The importance of thorough standardised training for all personnel employed on SAR missions cannot be over-emphasised. Failure of a single link in the often-complex chain of action required in SAR missions can compromise the success of the operation, resulting in loss of lives that might otherwise have been saved. The purpose of training is to meet SAR system objectives by developing SAR specialists. Since considerable experience and judgement are needed to handle SAR situations, necessary skills require significant time to master. Training can be expensive but contributes to operational effectiveness. Quality of performance will match the quality of training.

Consistency in training and sharing of information relating to search and rescue is promoted through the National Amendment and Training sub-committee and the National SAR Council. Standardisation of the prosecution of SAR operations is encouraged through these forums.

All personnel involved in SAR Operation need to undertake SAR-specific training.

Specialist team training may also be required. Where there is a requirement for multi-agency response, teams should be exercised in such a manner that each team and each team member understand the role that they play in support of the incident. An example of this would be where AMSA is the overall coordinator of an incident supported by the State/Territory Police and a State SES unit or units.

11.2 Requirement for Training

Training is critical to performance and safety. The SAR system should save those in distress when it can, and also use training to reduce risks to its own valuable personnel and facilities. Training personnel in making sound risk assessment will help to ensure that these trained professionals and valuable facilities remain available for future operations.

Search and Rescue organisations are responsible for the establishment of training programs for their own personnel to reach and maintain competence appropriate to their role.

Training of SAR personnel should focus on both the practical and theoretical application of SAR and can include the following:

- Study of SAR procedures, techniques and equipment through lectures, demonstrations, films, SAR manuals and journals.
- Assisting in or observing actual operations; and
- Exercises in which personnel are trained to coordinate individual procedures and techniques, or operate specialised equipment, in an actual or simulated environment.

11.3 AMSA Supplied SAR Training/Audit Equipment

AMSA supplies each RW rescue SRU SAR training equipment. This equipment is available for the maintenance of crew currency/recency and initial training of new personnel. Pyrotechnics left over from annual SRU Audits can also be utilised for unit training. Operational stock holdings are not to be used for unit training.

11.4 Search and Rescue Exercises

Each search and rescue organisation should periodically take part in coordinated search and rescue exercises. These SAR exercises should be designed to exercise the SAR system, in whole or part, and test such things as operational plans, communication procedures and facilities, individual staff performance, SAR unit performance and inter-organisation and/or international operations.

It is equally important that personnel have a good knowledge of the duties and procedures of other units and person who may be involved in a SAR operation, particularly those with whom they will have direct contact.

SAR personnel should visit other SAR units and the ARC where possible to become familiar with their facilities and capabilities.

The regular conduct of joint SAR exercises between SAR Authorities should form a part of any training program.

11.5 AMSA Standards Visits

AMSA sponsored Helicopter SAR Standards audits for RW SRUs are conducted between one and three times per year and can include:

- The study of the application of SAR procedures, techniques, and equipment through lectures, practical demonstrations, films, SAR manuals, and journals.
- Exercises in which personnel are trained to co-ordinate individual techniques and procedures in a simulated operation.
- Audit against the SAR Services Agreement; and
- Stocktake of AMSA supplied SAR equipment.

There are three main types of audit activity that can be conducted by AMSA, these are:

- Desktop Audits – performed remotely on an ongoing basis by AMSA staff.
- Announced Site Audits – Annual Base Audits and External Audits conducted IAW the Audit Schedule; and
- Un-announced Site Audits – an audit of operational performance and/or crew competency performed at a base without prior warning.

Base Audits

Base audits are carried out at each SRU IAW a fixed pattern so as ensure a continual complimentary relationship with other aspects of the administration of the service and the overall SRU programme activities.

Base audits will address contractual compliance, operational performance and crew competence. Base Audits will be conducted over a one (1) day period, usually on a weekday (Monday to Friday). Audits of SRUs will normally be clustered as may be geographically appropriate.

11.6 Box Knocking

Box Knocking is a simple and effective training procedure that can be carried out during unit training days to enable the SRU to increase crew water winching proficiency. It can be organized quickly without having to rely on a dedicated recovery vessel and crew or additional down the wire personnel.

AMSA supplied Box Knocking equipment consists of the Box Knocking Hook and Box Knocking Ring.

The ring is constructed around a 14" inner tube with a Herculite cover and an external buoyant grab line. To provide the correct buoyancy, the ring is filled with approximately 5½ Lt of water. The ring will then weigh approximately 5½ Kg.

The hook is constructed from marine grade stainless steel. The four prongs are designed to capture the ring.

The general procedure is to get the hook as close as possible to the ring i.e., touch it and eventually snag it: simulating a water winch pick-up.

Note: Box Knocking is originally a Royal Navy/Royal Australian Navy term and refers to the original practice, where a box was deployed into the sea and helicopter crews attempted to 'knock' the box with a grappling hook.

11.7 Training Life Rafts (FP Logs)

The FP Training Log simulates the size, weight and configuration of an operational Life Raft.

The FP Logs are used for training and audits in lieu of operational Life Rafts due to the significant time and cost required to rectify an inflatable Life Raft. The FP Log is configured in the same way as a Life Raft and is deployed using a Type 1 weak link and carbine hook attached to a floor hard point. The FP Log is coloured yellow for high visibility. The FP Log is classified as Air Droppable Equipment and can only be used for training/audit exercises.

Live training life rafts may be supplied on occasion for the conduct of operational performance assessment activities, crew competency, auditing or AMSA training delivery needs. Equipment use is to coincide with SRU organized and funded training activities. It is expected that AMSA personnel are permitted to join the activity where safe and appropriate.

FP Log (Mk 2 Raft Configuration)

The Mk 2 FP log has been designed as a simple to use item that can simulate the operational deployment of the Switlik Mk 2 raft.

The following steps are to be followed to reconfigure a Mk 2 FP Log back to a usable state following deployment.

Loop a No.64 rubber band through the nylon becket, located to the right of the stainless-steel U Bolt. Undo the 400mm length of 3mm braided cord (Venetian blind cord) that is threaded through the 11mm hollow plaited cord (the prussic knot). Thread one end of the 3mm cord through the rubber band and join with a single reef knot. Secure free ends of cord with insulation tape.

Form a 25mm eye at each end of the supplied 65Kg breaking strain Gear Release Cord with a figure of eight knot. This cord is the weak link.

IMPORTANT:

TO ENSURE THAT THE FP LOG OPERATES RELIABLY AND BREAKS AWAY FROM THE AIRCRAFT WITHOUT CAUSING AN OVERLOAD, IT IS ESSENTIAL THAT

ONLY A TYPE 1 WEAK LINK IS USED.

SARweb

12.SARWEB

12.1 Overview

SARweb is an interactive online system designed to provide an interface for the organisations that work with Australian Search and Rescue. Through authenticated access, it shows details of currently active Incidents and allows search Briefs to be downloaded and information on the search such as Incident file notes to be uploaded. Post search information including GPX tracks from on board tracking systems and the post mission debrief report can also be uploaded. Key information on equipment usage is passed through to AMSA's equipment maintenance contractor who organise replacements.

The system is designed to work with the Forward Field Base staff who may be sent onsite to manage large searches or complex searches. It allows them to have visibility of the overall search and the task for each asset. They can also allocate tracking units which provides frequent position reports on the location of each asset, so the ARC has visibility of their current location, and the search area covered.

SARweb is also used for the administration of AMSA's dedicated search and rescue Challenger aircraft. Daily Status Reports from each aircraft detailing its location and availability are uploaded and visible in the ARC search and rescue system Nexus. Key Performance Indicators associated with the service are captured and reports provided to the company that runs the aircraft and the contract administrators at AMSA.

12.2 Supported Devices

SARweb has been designed for use on desktop computers, mobile phones, and tablets. It has also been designed to operate on various web browsers. However, due to the considerable number of devices and web browsers currently in circulation, SARweb cannot be guaranteed for use on all devices and browsers.

SARweb has been assessed for use as follows:

Operating systems: Microsoft Windows 7 and Windows 8; Apple mobile operating systems iOS 6.x and iOS 7.x; Android mobile operating system version 4.x.

Web browsers: Microsoft Internet Explorer version 8.x and above; Google Chrome and Mozilla Firefox.

If you are using operating systems or web browsers that are not listed above, SARweb may not work as expected.

In order to use SARweb you must configure your browser to accept cookies. Cookies are pieces of information a website can transfer to an individual's computer hard drive through a website. In SARweb, cookies are used to help identify you during your secure session. You must also configure your browser to allow JavaScript to operate. JavaScript provides a more satisfying user experience and without it some web pages will not operate as intended.

Note that SARweb response time may be affected by your connection speed and the processor speed of the device you are using.

12.3 Login

To gain access to the SARWeb portal the main means to access.

Clicking the link in the Tasking email from the ARC.

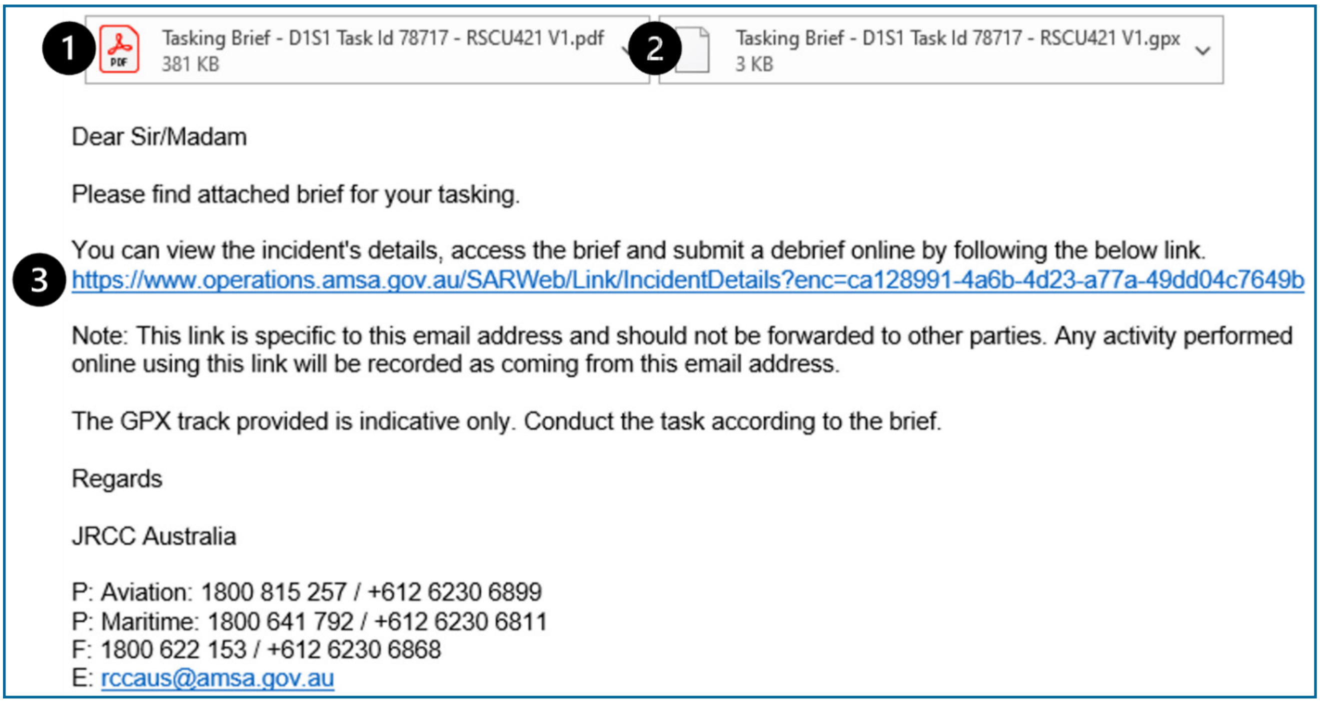
12.3.1 Tasking Email Link Access

When the SRU is tasked by the ARC, the SRU or Pilot will receive a Tasking Brief Email.

The email will be sent from **rccaus@amsa.gov.au**

This email contains:

- Tasking Briefing in PDF Format.
- Tasking Search / Waypoints in GPX Format (See GPX Import Section); and
- Hyperlink to SARWeb.



1 Tasking Brief - D1S1 Task Id 78717 - RSCU421 V1.pdf 381 KB

2 Tasking Brief - D1S1 Task Id 78717 - RSCU421 V1.gpx 3 KB

Dear Sir/Madam

Please find attached brief for your tasking.

You can view the incident's details, access the brief and submit a debrief online by following the below link.

3 https://www.operations.amsa.gov.au/SARWeb/Link/IncidentDetails?enc=ca128991-4a6b-4d23-a77a-49dd04c7649b

Note: This link is specific to this email address and should not be forwarded to other parties. Any activity performed online using this link will be recorded as coming from this email address.

The GPX track provided is indicative only. Conduct the task according to the brief.

Regards

JRCC Australia

P: Aviation: 1800 815 257 / +612 6230 6899
P: Maritime: 1800 641 792 / +612 6230 6811
F: 1800 622 153 / +612 6230 6868
E: rccaus@amsa.gov.au

NOTE:

Accessing SARWeb by the email hyperlink will take you directly to the Tasked Incident Page.

You do not need any sign-in details to access SARWeb via the link (Incident Page).

12.4 Incident Page

The incident page displays all details relating to the current tasked search.

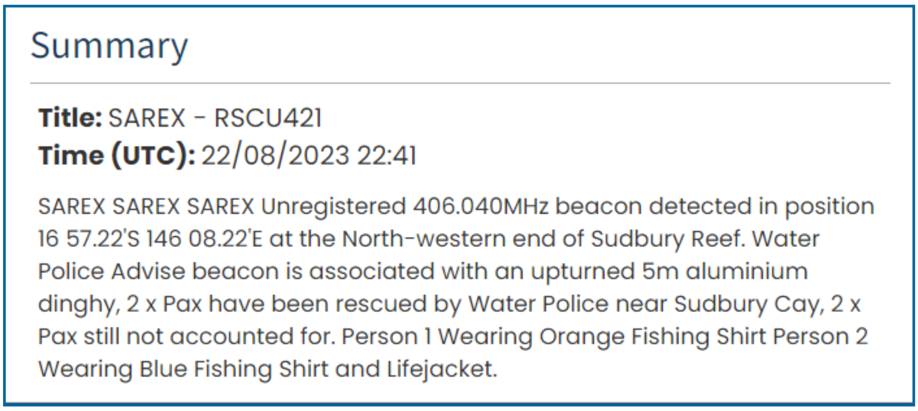
The Page is split into several different sections:

Incident Number

Current Incident Number.

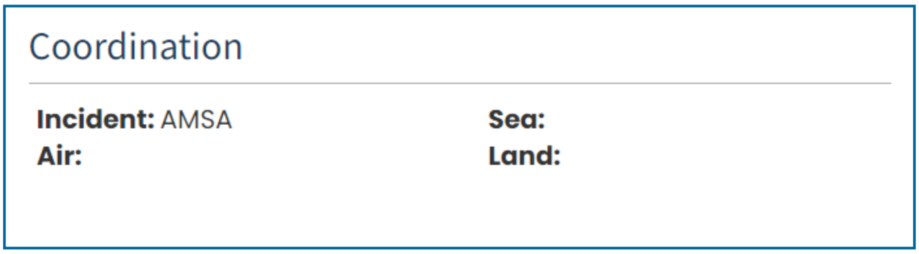
Summary

Provides a summary of the task details and process to date.



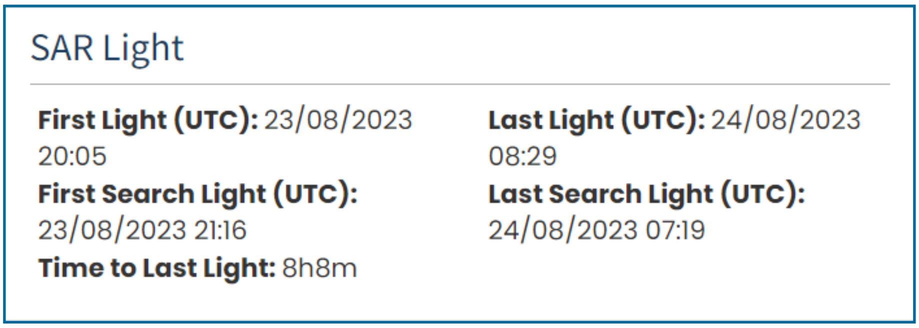
Coordination

Outlines who are the responsible agency for the incident.



SAR Light

Provides details on first and last light and first and last search light for the search area.

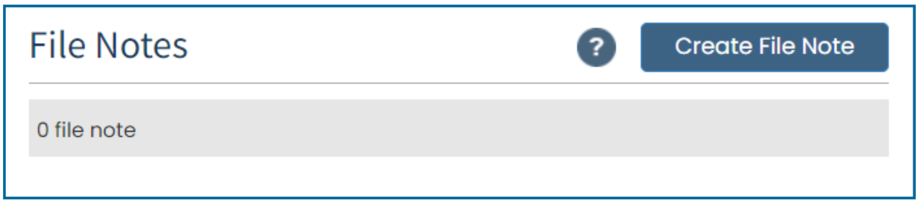


IMPORTANT:

SAR Light Details are calculated for the search area and may differ from arrival aerodrome first and last light depending on transit distances.

File Notes

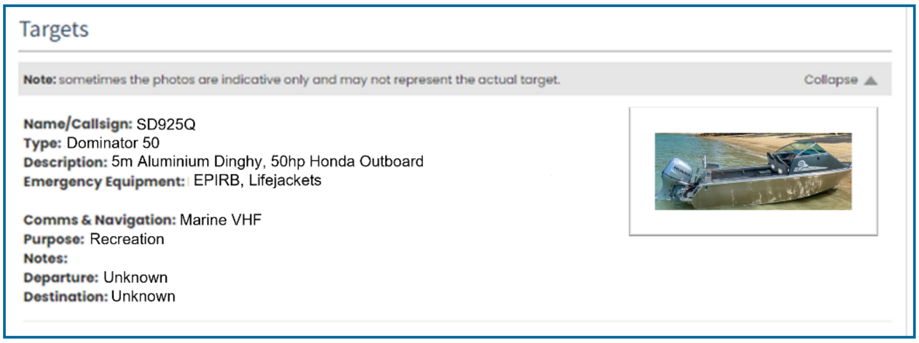
Used by AMSA Staff on FFB duties



Targets

Provides details of the search target if details are known.
May not be populated for initial search depending.

Note: You may click on the image for a larger view.



Allocations & Tasks

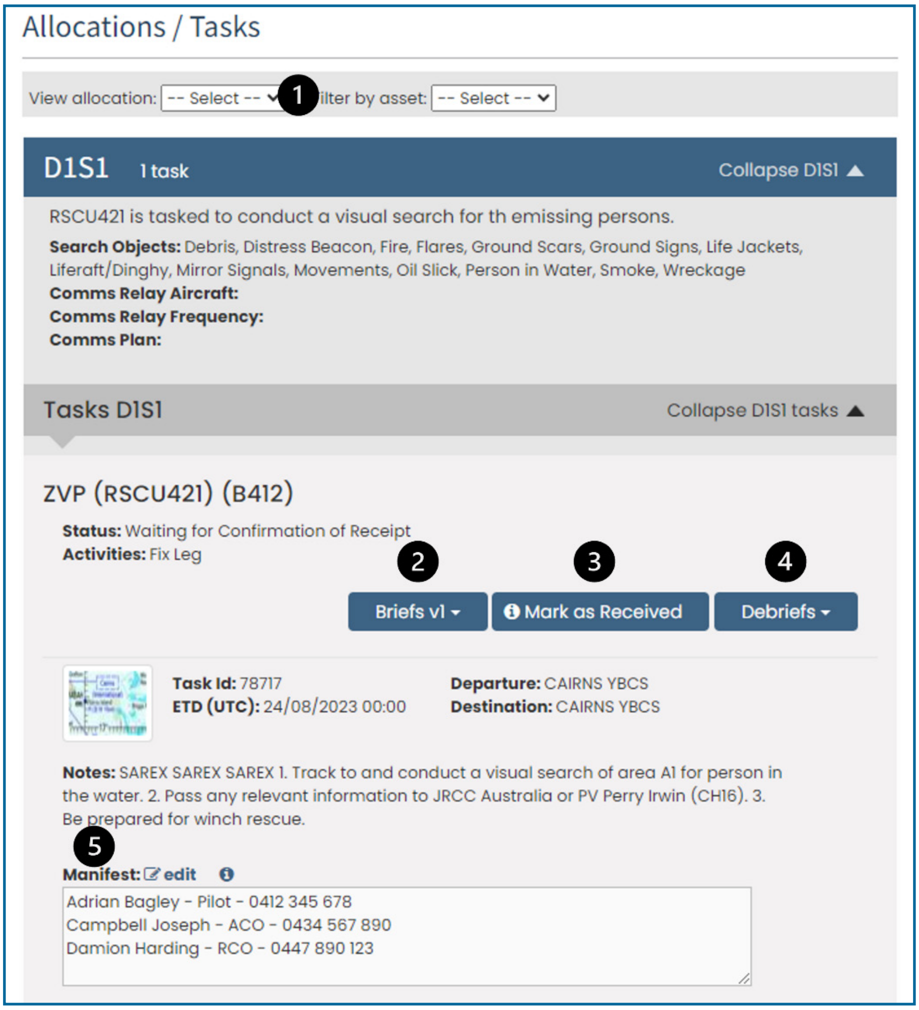
This section contains all the required details for the tasking.

Provides an overview of all tasked assets to the task.

Contains Search Brief and GPX files for download for your Task.

Provide means of providing online Debrief.

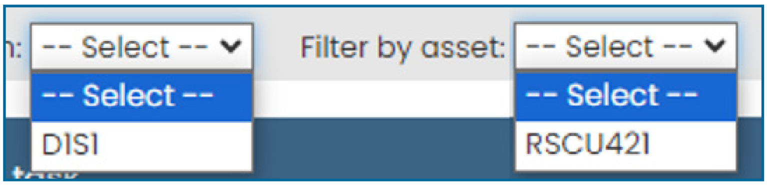
All tasks are grouped by search number D1S1 – D1 S2 etc.



1

Filters

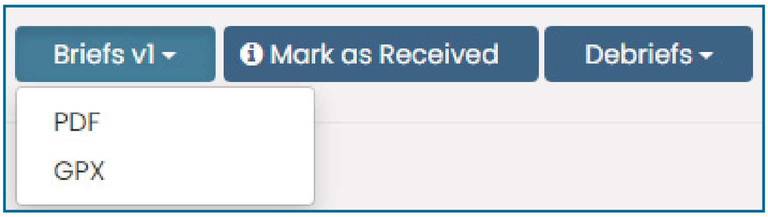
During large multiday or multi asset searches you can filter by search or asset registration / callsign.



2

Briefs

Contains links to download PDF & GPX copies of the search brief.



3

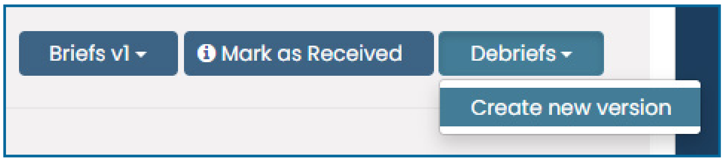
Marked as Received,

Once you have read your brief and understand the contents, click "***Mark as Received***" This electronically records the time you received, read, and understood your briefed tasking.

4

Debriefs

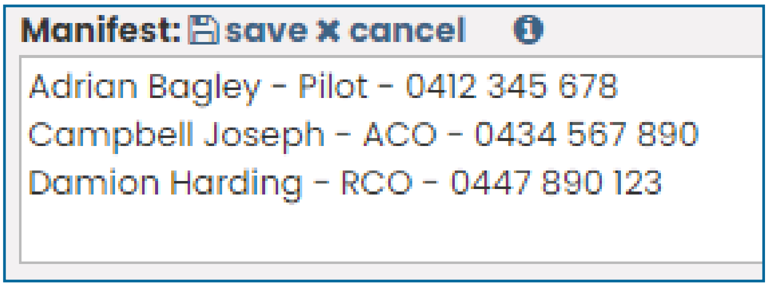
Clicking on the Debrief Tab opens the debrief submission window (See Debrief).



5

Manifests

This section is to provide a manifest of your crew onboard the aircraft during the task. This can assist the ARC in contacting onboard crew during emergencies or when operating from a remote locations to provide updates.
Clicking on the Edit Button allows access to fill in the Manifest Form.
Click Save when finished entering details to save.



12.5 Tasking Briefs

A complete example of a Tasking Brief is attached to Appendix A of this chapter.

The Search and Rescue Tasking Brief document concisely outlines the specifics of a search and rescue mission. It details the incident's nature, location, objectives, available resources, and expected challenges. This document serves as a comprehensive guide for SAR teams, providing them with essential information to effectively plan and execute the operation. It ensures a coordinated effort, optimal utilization of resources, and a clear understanding of roles and responsibilities among all involved parties.

Task Instructions:

The first page of the Tasking Brief contains a full page of instructions. This page is particularly useful for crews who have not had recent exposure to SAR Taskings or new crews on their first tasking. It outlines AMSA's main requirements of the SRU.

Situation

The top of the second page again outlines

- The Situation as it currently exists.
- An overview of the search and what each asset is tasked to complete; and
- Details of any Adjacent assets in the search area.

Task Details

The bottom of the second page outlined the Task details pertinent to the tasked SRU.

Important to read this section thoroughly taking note of Requested Search Heights and Search Speeds.

IMPORTANT:

Any concerns in Search Heights should be relayed to the ARC as any adjacent assets have been vertically separated.

Waypoints:

The waypoint page provides Coordinates to all the waypoints in the search pattern. Additionally track and distance calculations are also provided for cross referencing.

Map:

An overview map is provided of the search area. This map will also include any adjacent search areas if tasked.

SAR Flight Debrief Form:

The last three pages of the Tasking Brief is a paper copy of the debrief form.

This can be used for crews to document important information required for the debrief.

It is preferred the debrief be completed in SARWeb electronically however if unable to access SARWeb an emailed or Faxed version of the Debrief form can be used.

12.6 SARWeb Debrief

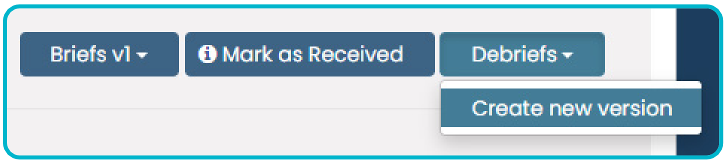
On completion of the sortie a comprehensive debrief is required to allocate hours flown, identify and disseminate sightings, alert the ARC to weather and task completion or lack of, and highlight any issues with the tasking itself.

The Debrief should be completed within 1hr of landing. If SARweb is unavailable due to internet connectivity issues, the paper debrief proforma from the search brief PDF may be filled out by hand and submitted to the ARC either by fax or voice.

Opening Debrief Page

From the incident page, ensure you are on the correct Task, Search and Correct Aircraft.

Click on the Debrief Drop down and select ***Create new Version.***

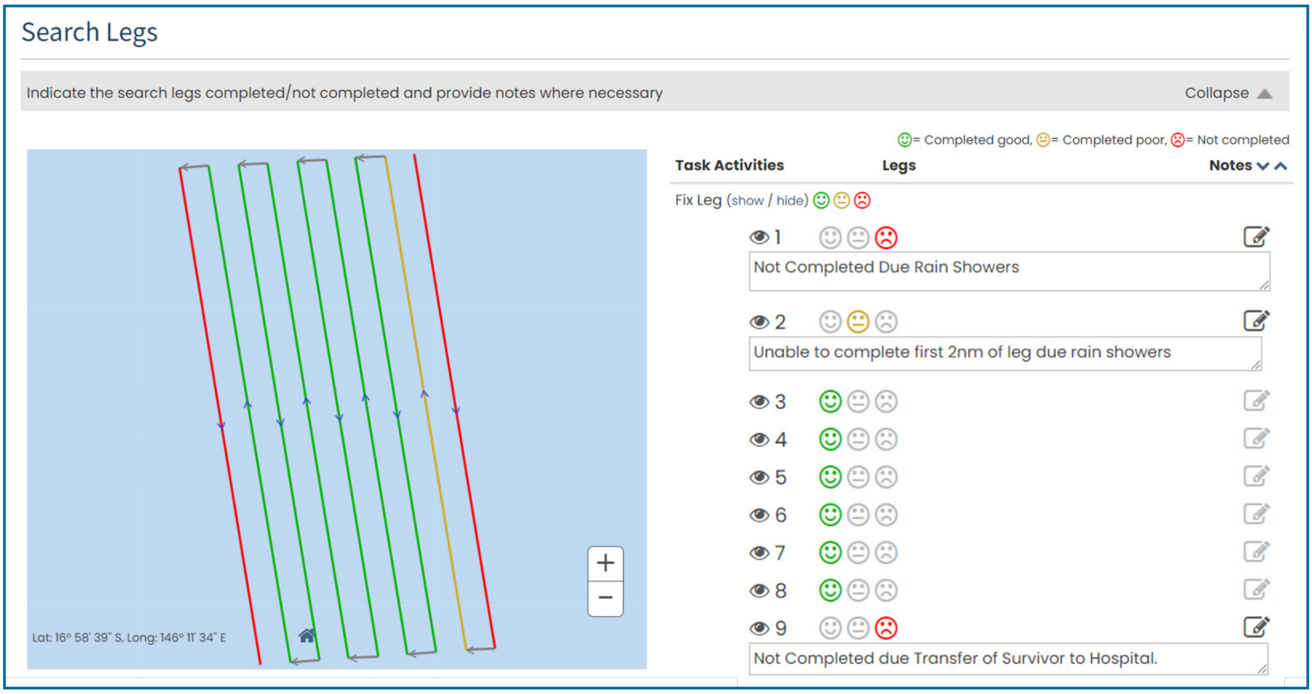


The Debrief Page will open.

Search Legs

Search Legs section is to be completed for all search legs whether searched or not. Each leg can be marked by selecting the appropriate face emoji for how effective the search was completed.

ICON	Description	Note Requirements
	Leg Completed (Good)	
	Leg Completed (Poor)	**SRU must note why leg was completed poor.** I.E – Unable to complete first 2nm of Leg due Rain Showers
	Leg Not Completed	**SRU must note why leg was not completed.** I.E – Not completed due PLE



Search Details

It is important and a requirement to include a detailed description of your search. The debrief is used by many different departments within AMSA for different requirements (On-going search planning, resupply of dropped stores, training planning, invoicing, official records, coronial investigations etc). Many of these department do not have the full understanding of the tasking or what duties each individual SRU performed.

The debrief form should be clear enough that your fellow crew members who were not on duty during the search can understand what happened just by reading it.

Additionally, if something did not go well, there are issues with SAR Equipment, suggestions for subsequent taskings, or other general issues or concerns, they may be recorded here for follow-up.

What did you do? | What were the conditions? | What were our issues or concerns?

Search Details

Enter any general information regarding the search   Collapse ▲

(max 4000 chars)

Tasked by ARC at 2330z to conduct a visual search for 2 missing people IVO Sudbury cay from a capsized dinghy.
Beacon heard passing false cape and reported to ARC.
Contact was made with Police Vessel on CH16 searching the area with no further information.
Search commenced on leg 2 at S16 56.7 E146 09.7 due rain showers to the east.
Very Good Search Conditions with reef fish, Sharks & Whales sighted
On completion of Leg 5 ARC contacted crew to dispatch a Fastwave at S15 56.6 E146 08.9 Dispatch completed successfully and returned to search at leg 6.
RCO spotted one person in the water on leg 8 at Position S16 55.8 E146 07.9
ARC and Police Vessel Notified and Winch recovery of the person was carried out.
On discussion with ARC and hypothermic condition of survivor crew elected to return survivor to Cairns Base Hospital.
During crew debrief it was mentioned during the winch evolution there were numerous attempts by ARC & Rescue Aircraft to contact the crew (Both advised and approved of winching

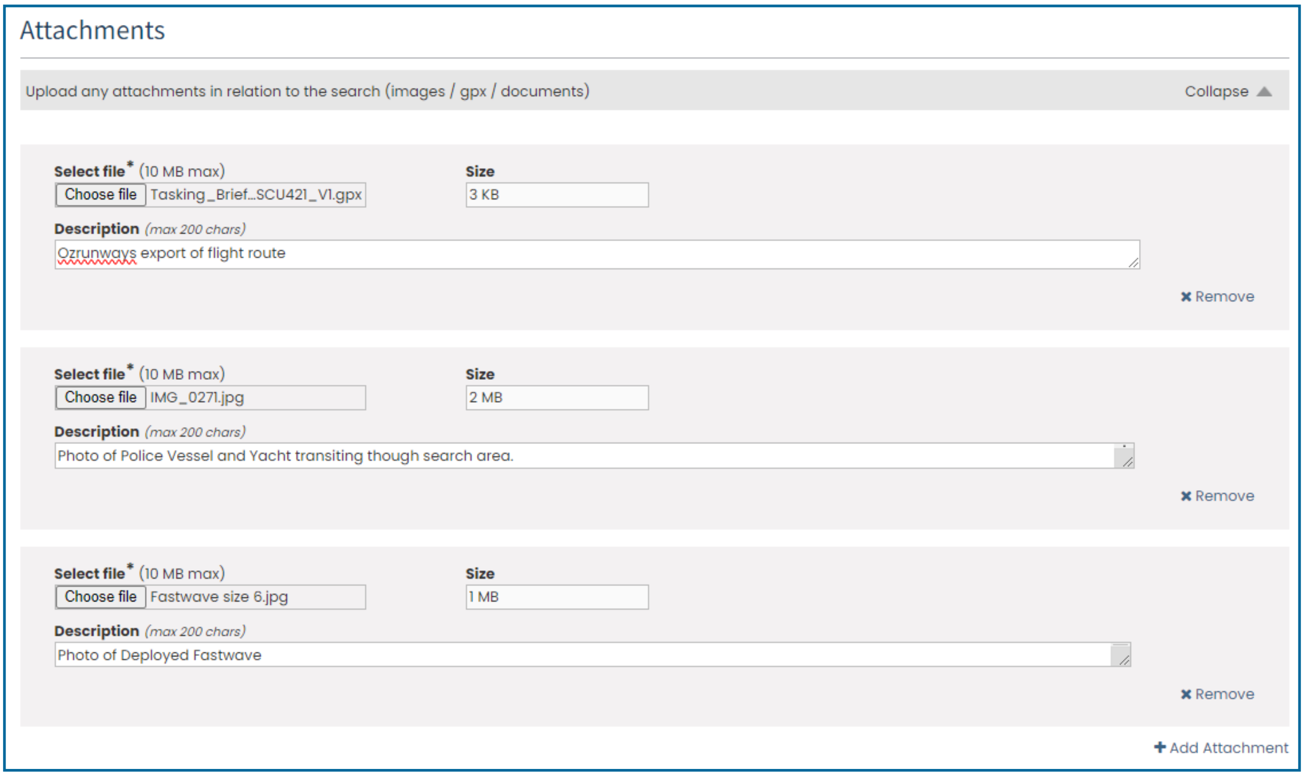
Attachments

Use this section to upload any Images or Documents that relate to you search tasking.

Write a brief description of the item once uploaded. Maximum attachment size is 10mb if you require to provide a document larger then 10mb contact ARC to details to file transfer server.

This includes.

- Photos:
  - General Area / Weather Conditions.
  - Photos of any sightings.
  - Photos of any dropped equipment (Not Mandatory).
  - Any other photo taken in relation to the search tasking.
- GPX / KML Files:
  - If you have a copy of your flown flight route it is beneficial to upload a copy to the attachments.
  - This can be downloaded from your EFB Navigation Software, Tracking Systems, Navigation GPS.
- Documents:
  - Any Documents that relate to the tasking.



Sightings

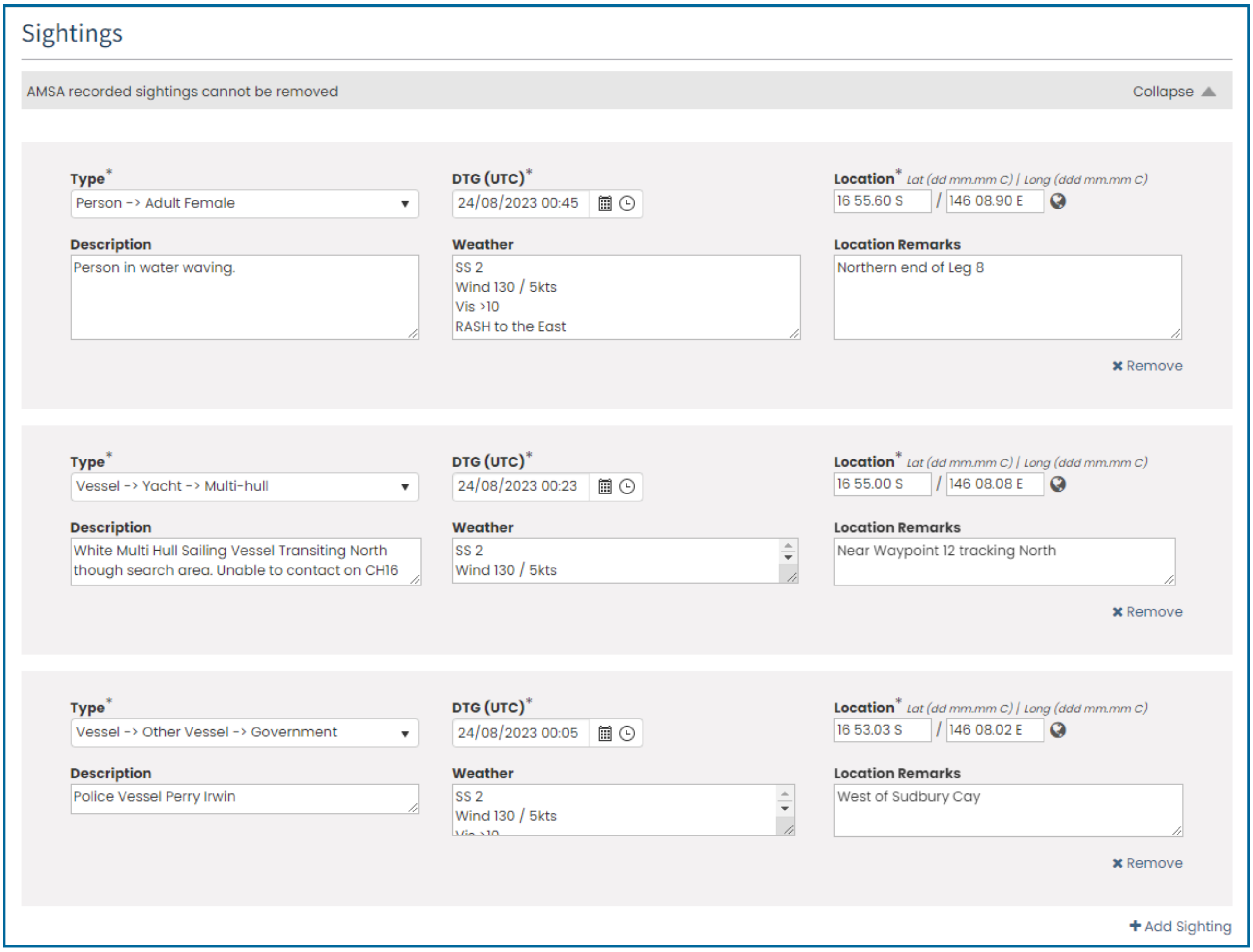
Record any related sightings to this section.

Any sightings reported through the Challenger crews or direct to the ARC may already be prepopulated

- Sightings of Search Target or briefed search objects.
- Sightings of any assets in the area that maybe able to assist.
- Sightings of Marine Life (This can help determine the extent of the search conditions).
- Any other sightings deemed appropriate.

For each sighting it is important during the flight to document as much information as you can. Including:

- Sighting Type.
- Time of Sighting.
- Exact Location of Sighting.

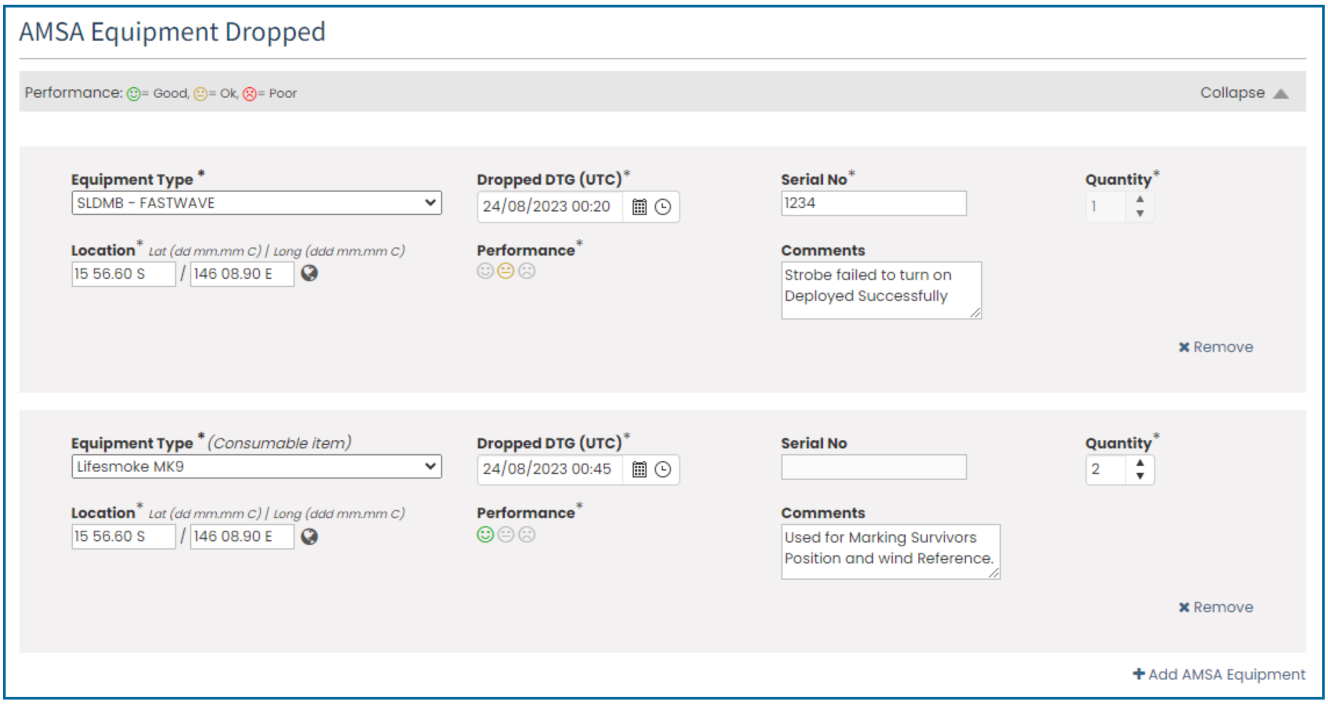


AMSA Dropped Equipment

Record details of any dropped SAR equipment. This ensures all equipment used is captured and ensures timely resupply of equipment to the SRU.

For Each item of equipment is it important to obtain the following information:

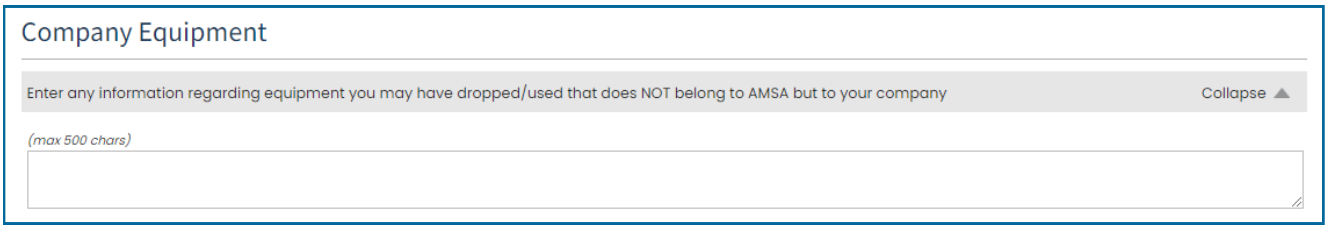
- Equipment Type.
- Time Dropped.
- Location of Drop.
- Serial Number.



Company Dropped Equipment

Any company owned equipment that is used or deployed during the tasking can be documented in the Company equipment dropped section.

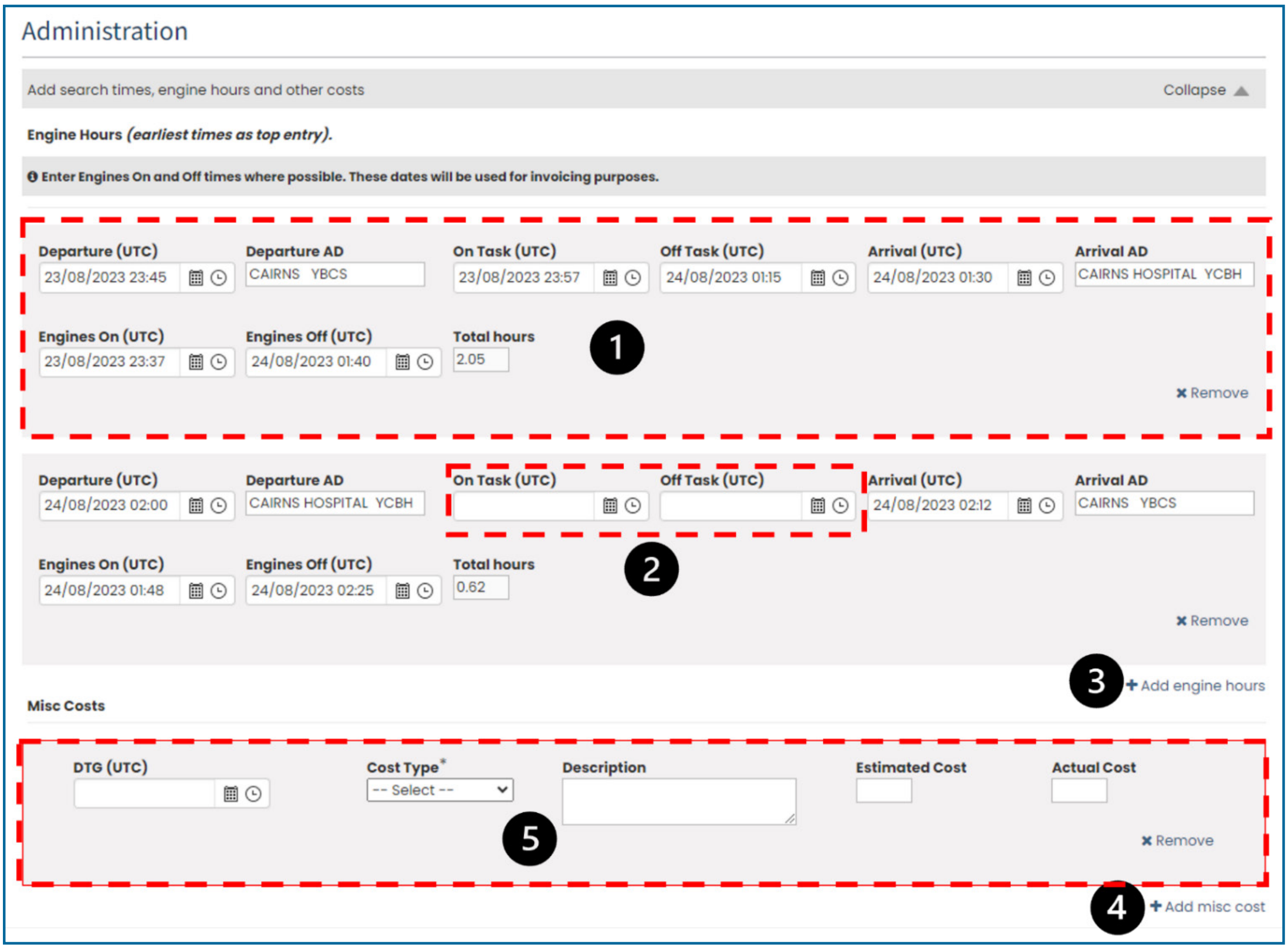
It is important where possible to gain approval from the ARC prior to dispatching any equipment.



Administration

The administration section is where flight timings are entered. It is used primarily for invoicing however the times are also used in AMSA incident reporting.

- Enter all Reportable flight times and location:
  - Departure & Arrive Times (UTC) & Aerodromes (Locations).
  - On & Off Task Times (UTC).
  - Engine On & Off Times (UTC).
- If the flight is a ferry or relocation with no searching, On & Off Task times are not required.
- To add additional legs associated to the same tasking click the *"+ Add Engine Hours."*
- To add any additional costs incurred by the SRU during the Tasking click the *"+ Add Misc Cost."*
- Enter as much detail as possible about the additional costs incurred.

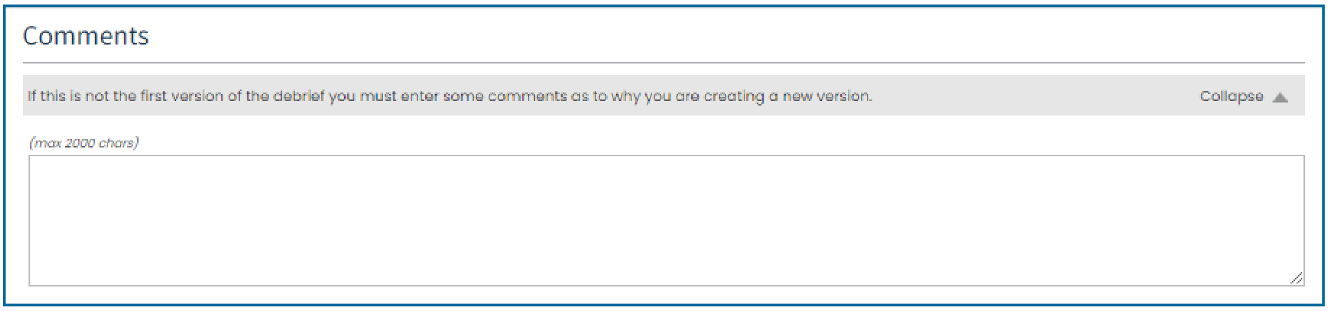


IMPORTANT:

All Times <u>MUST</u> be in UTC. Ensure accuracy of inputted times as this is what invoices are based on.

Comments

This section is to be used when submitting an updated version of the debrief to outline the changes / additions that were made since the previous version.



Save & Submit

On both the top and bottom of the form are buttons to save and submit the debrief.

Save: Save the form – this allows progress to be saved to allow completion at a later time.

Submit: Submits the Debrief to the ARC for review.

Once the Debrief is submitted, the ARC must be called to confirm receipt and discuss any important information and address any questions either the SRU or ARC have.

IMPORTANT:

Remember to save regularly!

Ammending the Debrief

Once the Debrief is submitted it becomes read only. If an error is noticed or more information needs to be entered the SRU can submit an additional version of the Debrief.

If a new/amended debrief is required, please call the ARC to have the task unlocked. Shortly after being unlocked, you can access:

- ‘Create new version’.
  - ‘Create new version’ displays all the previous version so only changes/amendments need to be completed for any new/incorrect information.

This ensures historical records of changes and locks the debrief once submitted to ensure new version information is accurately recorded and imported into the ARC incident system.

12.7 SARWeb Training

Training briefs and debriefs can be generated upon request to the ARC to facilitate practice and familiarisation.

Aviation – 1800 815 257

Maritime – 1800 614 792

Industry feedback is important for system improvement.

Contacts

13.CONTACTS

AMSA SEARCH & RESCUE

Aviation Search and Rescue

1800 815 257

Outside Australia: +61 2 6230 6899

Maritime Search and Rescue

1800 641 792

Outside Australia: +61 2 6230 6811

Marine Pollution Incidents

1800 641 792

Aids to Navigation Outages or Vandalism

1800 641 792

AMSA MEDIA

1300 624 633

amsa.gov.au/media

EMERGENCY BEACON & MMSI REGISTRATION

1800 406 406

amsa.gov.au/beacons

AVIATION ASSETS ON-CALL OFFICER

(02) 6279 5532

amsa.gov.au