Working with Aircraft

Contents

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Constructive feedback and suggestions for improvements to the SAR Training Matrix is appreciated. Please email feedback / suggestions to sartrainingfeedback@coastguard.co.nz **providing as much detail as possible. Thank you.**

Overview

Aircraft, both fixed wing and rotary, are an invaluable resource to marine SAR operations. They have two distinct advantages over surface craft — altitude and speed. They are, however, limited by the time they can spend in the air and by the prevailing weather.

This module is to provide Coastguard crew with the basic essential knowledge relating to the use of aircraft during marine SAR.

An extract from the Maritime New Zealand Accident Report of 'Capsize resulting in Fatalities (Pania Reef, Napier on 14 October 2004)' highlighting the role of Aircraft in marine search and rescue

- *At 1015 hours, a helicopter was paged by the Police to assist in the rescue operation.*
- *At 1034 hours, the Coastguard Air Patrol sighted an object in the water and dropped a smoke bomb close by as a reference mark. Shortly after a further smoke bomb was dropped when the Air Patrol spotted another object.*
- *At 1041 hours, the Coastguard vessel arrived at the location of the first smoke bomb and rescued Passenger 1 in position 39° 32.2' S 177° 00.4' E.*
- *At 1042 hours, a helicopter joined the search.*
- *At 1047 hours Big Kahuna arrived at the second smoke bomb and recovered the body of Passenger 3 in position 39° 32.4' S 177° 00.7' E.*
- *At 1204 hours the Coastguard Air Patrol sighted a person in water but lost sight of him in the sun. The plane found the body again at 1240 hours and dropped a smoke float.*
- *At 1245 hours, Big Kahuna recovered the body of the Skipper in position 39° 34.00' S 177° 01.06' E.*

Reference: http://www.maritimenz.govt.nz/Publications-and-forms/Accidents-and-investigations/Accident-reports/Big-Johnson-041150-mnz-accident-report2004.pdf

"In the search for the missing diver, volunteers battled treacherous conditions, making it extremely difficult for Coastguard Air Patrol and the rescue vessels to identify the whereabouts of the diver. Visibility dropped to less than 1km at times and a strong north-easterly gusting up to 30 knots brought strong seas.

But after less than an hour of searching, the diver was discovered by Coastguard Air Patrol who alerted Coastguard's Whangarei based rescue boat, Circa Rescue, with a smoke flare targeting the location of the missing diver. The rescued man was unharmed and taken back to Marsden Cove."

(27.02.13)

http://www.stuff.co.nz/sport/boating/news/6484950/Coastguard-to-divers-rescue

1. Aircraft Regulation and Policies

1.1 Civil Aviation Authority

The Civil Aviation Authority (CAA) is the government body responsible for enforcing the aviation law. Its role in the air is similar to that of Maritime New Zealand on the water, however it is far more regulated. All aircraft in New Zealand are subject to the Civil Aviation Act and Rules. These regulations are rigidly enforced and the penalties for non-compliance are high.

CAA accepts that in an emergency some actions may be required that in ordinary circumstances would contravene provisions of the Act. For this reason, Section 13A of the Act provides for pilots, under strict guidelines, to breach some regulations and rules in emergencies. The section provides for breaches in emergencies that arise during flight and for emergencies that require the immediate use of aircraft to render assistance.

In SAR situations, the use of aircraft to render emergency assistance is the more likely of the two scenarios. These types of situations may arise when urgent air transportation of persons, medical supplies or the aircraft's assistance in a search is required.

Whenever a pilot is required by emergency circumstances to breach the Act or its rules, they must advise the relevant air traffic control service of the action. The Director of Civil Aviation must also be advised of the circumstances that necessitated the breach.

Refer to the New Zealand Search and Rescue Module

1.2 Police and RCCNZ

The use of aircraft in SAR will be under the provisions of Category I where the Police have accountability and responsibility, or Category II where RCCNZ has accountability.

2. Coastguard Air Patrol

Coastguard Air Patrols (CAPs) are a resource available to Coastguard units, Police, or RCCNZ when air services are required during SAR operations on both land and sea. Most commonly, CAPs are called on to:

- Complete a 'search and locate' service.
- Communicate with land and sea-based rescue services and assist with the coordination of rescue response.
- Aid in the rescue of persons or vessels in distress.
- Drop smoke or dye markers and rescue tubes.

Coastguard Air Patrols (CAPs) operate in accordance with the CAA, RCCNZ and Police regulations. They may have their own additional

Standard Operating Procedures (SOPs), and these will differ for each CAP Unit.

2.1 CAP Locations

Coastguard Air Patrols are established in strategic areas throughout the country. CAPs and Coastguard marine units are encouraged to train and work together to strengthen the operational efficiency of their region. The diagram below shows CAP locations, and the approximate distance that can be flown in 30 minutes.

There are ten CAP units;

- Northland
- Auckland
- Bay of Plenty
- Taranaki
- Hawkes Bay
- Kapiti
- Nelson
- Kaikoura
- Canterbury
- Southland

3. Aircraft Personnel

Aircraft used for SAR purposes are generally either single or twin engine fixed wing aircraft, with a crew of up to four, or a helicopter with up to five crew.

Pilot in Command

The pilot in command, who may or may not be SAR personnel, has similar overall responsibilities to that of a CRV Skipper. Other than flying the aircraft, their main responsibility is to avoid unsafe situations, even if it means aborting the mission.

Co Pilot

This person shares some of the responsibility of the pilot in command on a larger aircraft or helicopter. The co-pilot usually handles navigation, communications, instrument monitoring, and crew concerns. The responsibilities of the co-pilot may vary according to the type of aircraft and mission - however, the pilot in command always has the final say.

The ever-unpopular 'standby' message from a radio operator is particularly annoying for air crew who may have very limited flight time remaining due to their fuel reserves and who may travel a long way in the "wrong" direction if not directed in a timely manner.

In Flight Coordinator (IFC)

The term In Flight Coordinator (IFC) previously known as a Tacco (Tactical Coordinator), applies to Coastguard Air Patrol members who have been specifically trained in the use of the marine plotters, on-board planning, execution of the search operations, and SAR communications. It is the IFC who is responsible for the execution of search operations and communications with the IMT.

Refer to the SAR Communications Module

In Flight Observer (IFO)

The In Flight Observer carries out an observation and search role. An observer's responsibility also involves advising the pilot of any relevant hazards in the air.

Crew Member (Helicopter)

An air crew member is usually trained in a number of on-board functions, such as hoist operator or paramedic.

Specialists (Helicopter)

The term 'specialist' refers to a variety of air-trained personnel capable of performing specific SAR functions — for example, rescue divers, replacement vessel skippers, medical personnel, photographers, and police.

Refer to the CIMS module

4. Aircraft Operations

4.1 Incident Management Team (IMT)

The IMT will be responsible for tasking required aircraft. A CRV Skipper or On Scene Command may request an aircraft, but it is the IMT who

will task the aircraft, subject to approval of the Co-ordinating Authority – either the Police or RCCNZ.

In such circumstances, the IMT will be expected to adhere to the following safety guidelines;

- Known and inherent risks must be identified to ensure that personnel and equipment will not be jeopardised, nor the mission attempted, unless victim's lives are known to be at risk and the chances of saving the lives are within the capability of the personnel and equipment available.
- Any instructions for tasking an aircraft must be issued as a request, not an order. The point at which unreasonable risk overtakes the likelihood of securing the safety of human life is the point where the operation must be terminated. In other words, there is a limit to which rescuers can be expected to go; beyond that, tasking cannot be justified.

4.2 Aircraft Tasking

In the course of deciding that an aircraft is required for a SAR operation the IMT must carefully consider a number of issues;

- What type of aircraft will best suit the needs of the operation?
- What tasks will the aircraft be required to complete?
- What search patterns will best suit the aircraft, the incident, the surface craft, and of course the conditions?

Some SAR incidents can attract media attention, and the Police or RCCNZ may request the CAA to order temporary restricted air space or altitude reservations. These prevent unessential aircraft from interfering with SAR aircraft operations, and avoid unnecessary hazards to the aircraft. Should these restrictions be put in place, the IMT should advise all SAR personnel involved in the operation.

4.3 Aircraft Communications

Most helicopters and fixed wing aircraft deployed in SAR operations and exercises are able to maintain communications on marine VHF radio. On occasion, 'aircraft of opportunity' without marine VHF radio will be used for SAR operations, and communications will need to be effected by other means such as cell phone or aeronautical service VHF radio (these radios are installed on some CRVs). Where no radio communications are available, messages may need to be of the visual type.

- An aircraft may need to monitor more than one radio.

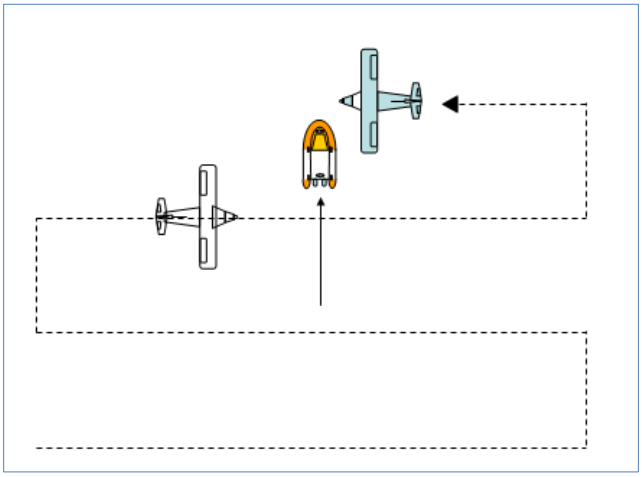
- The height at which an aircraft flies enables it to pick up radio signals that your vessel may not receive; therefore your station identification should be used constantly, to define who is calling.

Refer to the Search Techniques Module

4.4 Combined Searches – CRV and Aircraft

Probably the most successful type of combined search pattern is the Creeping Line or Parallel Track search pattern. It is particularly effective, provided good surface-to-air communications are maintained.

The aircraft flies over the search area in a series of equally spaced parallel tracks. At the same time, the vessel(s) engaged in the search drive at a pre-calculated speed through the centre of the search pattern. The speeds of vessel(s) and aircraft are synchronised so that the aircraft flies over the vessel(s) at the middle of each leg.



CAP provide an invaluable service to SAR operations (both land and marine) and it is their ability to search faster and higher (with a correspondingly greater sweep width) that makes their aircraft so effective in the search and locate phase of an operation.

What is not often appreciated is that not only can CAP provide a search resource that can cover the same area at anywhere between 5 to 10 times quicker than a vessel, but it can do so at a far lower general operating cost (including fuel consumption) than most CRVs.

5. Helicopter Operations

As well as searching, helicopters can affect transfers of people or equipment in a SAR situation.

5.1 Information Required by Helicopter

Ideally, most necessary information about the target will already have passed from the IMT to the air crew. The helicopter will also

establish communications with the CRV. The information usually needed by the helicopter crew is:

- Position (Latitude and Longitude / bearing and distance from a charted feature)
- Speed of vessel (knots)
  - Course (True or Magnetic)
  - Name of vessel
  - Type of vessel (in particular does it have any masts, booms or derricks)
  - Length
  - Colour
  - Distinctive features
  - Clear deck space –approximately how big?
  - Wind speed (knots)
  - Wind direction
  - Sea state
  - Are communications available on board other vessel?
  - What frequencies are being used?
  - In the case of a medical incident, details pertaining to the patient's condition and any medical equipment available will be asked for
  - Position of and time to nearest landing point (vessel)

In the case of medical emergencies the priority of the helicopter is to get a paramedic to the patient without unnecessary risk to the aircraft and crew. If this can be done without the need for a winching operation and without undue delay then it will probably be the preferred option.

5.2 Winching

Rules for winching

The basic tenets of safe winching are enshrined in law. The CAA rules state that a pilot performing an operation involving the suspension of a person beneath a helicopter shall ensure that:

- The distance a person is carried is the minimum distance necessary to achieve the objective of the operation.
- The equipment on which a person is suspended is capable of release from the helicopter by the crew, and that the release

system is so arranged that two separate actions must be taken to effect release.

- Unless the person is unconscious or unable to understand, that person must be briefed by a crew member of the helicopter on normal and emergency procedures appropriate to the operation.
- Except in an emergency necessitating the urgent transportation of persons or medical supplies for the protection of life or property, no more than one person at a time shall be carried as a sling load.

Prior to Winching

- All loose items on board the vessel must be secured to avoid being blown up and into the helicopters' rotors/air intakes.
- If the CRV has an upper helm, the helmsman should helm from inside the CRV.
- It is quite common for a helicopter to fly a circuit around the vessel once it reaches the scene, to assess the situation.
- On making contact with the vessel, the pilot will want to discuss the method to be used for transfer.
- The vessel(s) may be asked to alter course and speed to suit the prevailing weather, or consulted as to the best course to minimise the roll of their vessel.
- Whatever method employed, all crew should be briefed as to the adopted procedure.

Static electricity can build up in any helicopter. The larger the helicopter and the longer it has been in the air the greater the charge. The size of helicopter and the distances flown mean that for most Coastguard operations the shock that can be received from a winch wire is more akin to the shock you might receive when closing the car door. While not at a dangerous voltage CRV crews should be aware of the potential of receiving a shock.

Winching

There are many different methods and variations used in winching operations. Coastguard crews should be aware of the procedures and practices in their local area. Generally the different methods of transfer are;

- Direct.
- Hi line.
- Safety line.

Direct

Generally used with vessels that have unobstructed deck areas large enough for a safe transfer in the prevailing conditions. The vessel will be asked to steer a course with the wind at an angle to the bow (typically between 10 – 30° off the wind) and at a given speed.

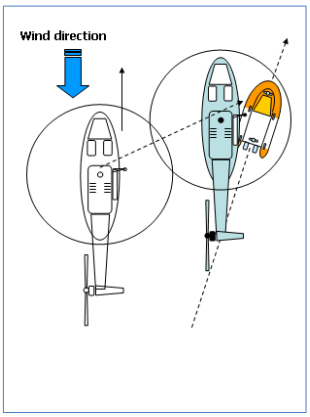
The actual course and speed will be confirmed by the helicopter pilot. The helicopter will maintain a head to wind aspect while matching the vessels speed and crabbing across the wind until directly overhead. The winch person is then winched directly onto the vessel.

Hi Line Transfers

Generally used on all vessels having masts and rigging which prevent winching operations being carried out directly over the vessel. The Hi line is usually about 50 m of small diameter braided line. A karabiner clip is attached to both ends. The top end has a weak link, and is attached to the helicopter winch hook. The bottom end has a small weighted sack attached to it. Some helicopters may have a static discharge wire attached to the end of the winch cable; crew should ensure that the static discharges through the wire and not through them. The normal procedure for Coastguard vessels is for the helicopter to come to the boat.

The Skipper and crew of the vessel must adhere to some very simple rules:

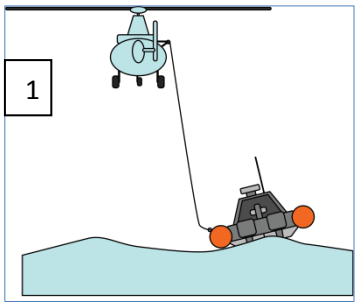
The helmsman must concentrate maintaining a constant course and speed, not watching the helicopter.



The vessel will maintain a constant speed and course depending on the helicopter pilot's instructions. Typically this course is approximately 10°- 30° off the wind. Whether the wind is on the port or starboard bow will depend on the configuration of the helicopter.

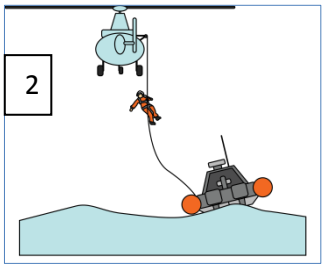
Communications with the helicopter once winching has started should be in the case of emergencies only.

The most crucial part of a winching operation is the flow of information between the winch operator and the pilot of the helicopter. It is imperative that these two personnel are able to communicate without interruption.



The helicopter will manoeuvre directly overhead. The helicopter winch operator will lower the weighted end of the Hi line to the deck of the vessel. (1)

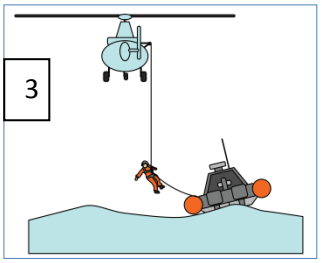
If available, two crew members should receive this end (a boat hook can often be of help) and take in the slack, coiling the loose line onto the deck or preferably into a bucket or similar. This will allow the line to be contained and less likely to tangle on deck and allow it to run freely. ***The Hi line or winch wire must never be attached to any part of the vessel.***



Once the line has been taken by the deck crew, the helicopter will move away to one side and prepare the winch person for lowering to the deck.

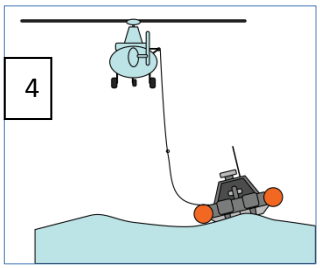
At this point, the deck crew must pay out the Hi line. The helicopter will move to a safe height and position, and then commence to lower the winch person. (2)

The Hi line should never be wrapped around the wrist or arm when handling. Gloves should be worn whilst handling the high line.



The deck crew should take up the slack and maintain tension in the Hi line so that the person being winched does not swing.

The deck crew must continue to take up the slack as the winch person descends and on signal from the winch person haul them on board. (3)



When the winch person is on deck, and having disconnected themselves from the winch hook, the helicopter will move away.

The deck crew should now pay out the Hi line. The winch person will brief the deck

crew on any requirements. (4)

Using the Hi Line for Uplifting
The winch hook is pulled back on board to allow the casualty and / or the winch person to be attached. They will then be lifted off the deck.

The deck crew must maintain tension on the Hi line to prevent excessive swinging. Once the casualty and / or the winch person are inside the helicopter, the high line will be recovered by taking it up until only the weighted end is left on the vessel.

After the last winch the deck crew should clear the weighted end from all obstructions, and the Hi line will be recovered by the helicopter crew.

Alternatively the Hi line may be jettisoned by the winch person (by unclipping the end attached to the winch hook) and left for the vessels crew to recover.

Safety Line Transfer
Often used when a disabled vessel such as a yacht has too much pitch and roll to safely use a Hi line transfer or if no one onboard is capable of assisting.

A safety line is attached to the harness of the paramedic or rescue swimmer.

The helicopter hovers downwind of the vessel at a safe jump height. The paramedic or rescue swimmer enters the water and swims to the vessel. If the paramedic or rescue swimmer has difficulty in the water, the winch operator can deliver the winch hook to them via the safety line.

The swimmer can then clip on to the winch hook to be recovered by the helicopter.

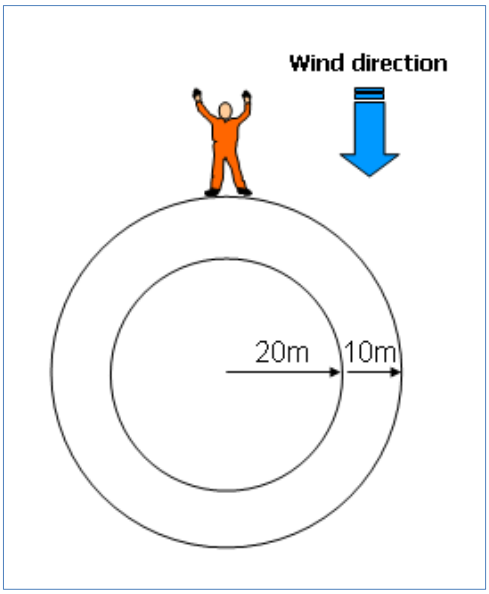
5.3 Preparing a Landing Site

Winching operations have a higher associated risk than transferring a patient to a helicopter on the ground. If a patient can be taken ashore for helicopter transfer without undue delay then it will generally be the preferred option.

Coastguard crews should be aware of suitable helicopter landing sites in their operational area, where it would be feasible to transfer a patient ashore.

There are the basic but essential CAA guidelines to choosing and preparing a helicopter landing site.

- The helicopter will need flat firm ground for a diameter of not less than 20m.
- There should be no obstructions or foliage higher than 1m for an additional 10m around the landing site.
- Ideally it should not be in close proximity to any overhead cables, buildings or trees.
- Clear away / secure any objects, clothing or foliage that could be blown around by the rotor wash (this can be in excess of 100kmh).
- One person should be positioned with their back to the wind, hands held above their head at the up wind extremity of the landing site.
- If in contact with the helicopter pilot, identify any potential hazards in the area. i.e. “There are power lines approximately 200m to the south of the landing site.”



Directions can also be given by using left and right or by the clock face method, but should be given from the helicopters point of view.

"There is soft ground 100 m to your left of the landing site."

"Phone lines are 100m on your 10 clock."

Night Landing Operations

The preparations for a landing site at night are the same, but with the additional need to illuminate the area.

- Under no circumstances should any light be shone directly at the helicopter.
- Torches or vehicle headlights can be used to illuminate towards the centre of the site.
- Chemical sticks can be used to mark the outside edge of the site.
- Any lights used must be 'dipped' to illuminate the ground.
- Flashing lights can initially help the pilot identify the site.
- Lights used to illuminate hazards (e.g. shining up poles to indicate presence of wires).

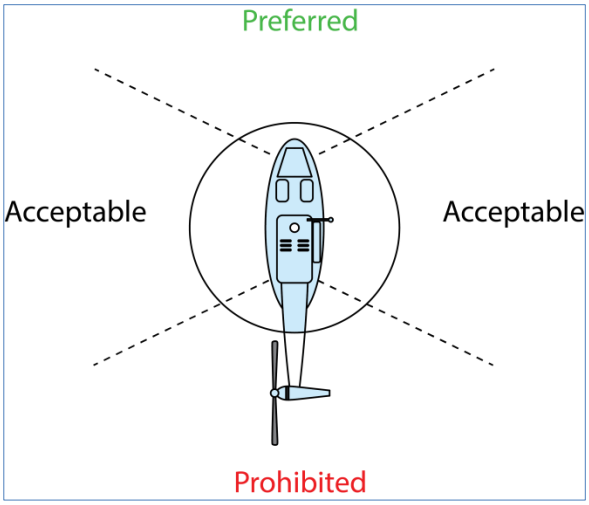
The person positioned at the upwind end of the site should be illuminated from behind and preferably dressed in reflective clothing.

5.4 Safety around Helicopters

There are some basic safety rules that must be adhered to while a helicopter is on the ground.

- Do not approach the helicopter unless signalled to do so.
- The preferred way to approach a helicopter is towards the front of the aircraft.

- Only approach in clear view of the pilot or crew.
- If you do approach the helicopter keep your head low in a crouched position.
- The tail area of a helicopter is a 'no go area.'



6. Aircraft Ditching

In the event that an aircraft is unable to remain airborne the pilot may choose to land, or ditch, into the water. If this occurs there may be time for the pilot to supply an accurate report of the craft's ditching position.

If in the immediate vicinity a CRV crew member should be able to give the pilot the following information:

- Wind direction.
- Wind strength.
- Sea state, in particular height and direction of swell.

On Scene at Impact

Even after a 'successful' ditching a fixed wing aircraft will normally sink within a few minutes. Helicopters unless specifically designed to float will capsize and sink rapidly.

The ditching heading may be determined by the major swell system, rather than from just the wind direction.

Any scene that you may attend will be individual; therefore planning for this eventuality is difficult - use SAP and react accordingly.

Consider the following factors:

- Ensure your own safety in the area – SAP. Aviation fuel will float on the surface for some distance from the point of impact.
- Mark the position with GPS &floating datum.
- Search for survivors. - confirm if any other persons are trapped within the wreckage.
- Practise extreme caution if contemplating entry into the aircraft.
- Do not make fast to it.
- Dependent on the circumstances (and if practicable) attach a datum buoy to the aircraft.
- Commence a search pattern if all crew not accounted for.
- Administer first aid to any injured victims.
- Arrange for evacuation of injured victims.
- Assist in recovery as directed by the IMT.