The International Maritime Rescue Federation Mass Rescue Operations Project:

The use of aircraft

Overview

The IMRF’s mass rescue operations (MRO) guidance is provided in 30 separate chapters at www.international-maritime-rescue.org. For downloadable documents referenced in this chapter please use the drop-down menus or return to the MRO project main page under ‘Resources’. For a general introduction please see chapter 1, ‘Complex incident planning – the challenge: acknowledging the problem, and mass rescue incident types’.

This chapter discusses:

- types of aircraft that may become involved in an MRO
- fixed-wing aircraft roles in an MRO
  - coordination
  - search
  - surveillance
  - air drops
- rotary-wing aircraft roles in an MRO, in addition
  - delivery of specialist personnel, equipment or supplies
  - the rescue of people who would otherwise hinder the operation
  - medical evacuation of urgent cases from other rescue units
- keeping aircraft on stand-by / in reserve
- matching aircraft capabilities to the circumstances and tasks required

1 Discussion of the use of aircraft

1.1 Specific issues relating to the coordination of aircraft involved in an MRO are covered in chapters 19 (on SAR mission coordination) and 21 (aircraft coordination). Issues relating to the retrieval of people in distress are discussed in chapter 8; accounting for everyone involved in chapter 9; and the transfer of survivors to places of safety in chapters 10 & 11. Providing on-board support as well as, or instead of, rescue is discussed in chapter 15. The use of surface units is discussed in chapter 22, and the efficient communications necessary to overall success are considered in chapter 25.
1.2 All of these are aspects of, or relate to, the use of aircraft in an MRO, and the reader is referred to the relevant chapters listed above – and to the guidance in the IAMSAR Manual. Volume II of the Manual provides the main international guidance on the coordination of SAR, including MROs; and Volume III, which is carried by ships trading internationally and some aircraft, is the main reference document for these SAR facilities.

1.3 A significant amount of additional guidance on multiple aircraft SAR operations has recently been added to all three volumes of the IAMSAR Manual. The procedures and principles are described in Volume II Chapter 7 and in Volume III Section 10. This guidance should be referred to by MRO planners. Further guidance relating to SAR aircraft use may be found in Volume III Sections 7, 15 & 16.

2 Types of aircraft that may become involved in an MRO

2.1 While any type of aircraft might become involved in an MRO, most military, commercial and general aviation aircraft – especially fixed-wing aircraft – are unlikely to have more of a role than, perhaps, initial communications and locating and standing by people in distress until rescue units can arrive, as discussed in general in the IAMSAR Manual. For our purposes here, then, we will focus on aircraft which are designated SAR units¹ or specialist support aircraft such as transport helicopters used by the offshore industries.

2.2 Not all helicopters are suitable for operations over water; not all are winch-fitted; and in many cases landing on ships to pick people up or to drop them off will be too unsafe to be attempted. On the other hand, winch-fitted maritime SAR helicopters are a major aid to maritime rescue generally, being able to transit quickly to the scene of distress, to deliver specialist assistance, to retrieve people who may not be accessible by surface rescue units, and to deliver them rapidly to a place of safety. If available, helicopters will certainly have a place in an MRO – but it is worth considering how they can best be used: see below.

2.3 Fixed-wing aircraft cannot conduct rescues (except in highly specialised circumstances unlikely to be relevant here) but also have rapid transit times – more rapid than helicopters in most cases – and the ability to deliver supporting equipment and, sometimes, specialist assistance. Fixed-wing SAR aircraft are able to cover search areas rapidly and effectively, and they can make good communications platforms. They can reach remoter areas and/or remain on-scene longer than most helicopters; their height can enable them to act as communications relays; and – if they and the relevant ground stations are suitably equipped – they can stream back imagery and other on-scene data, of considerable use to the Rescue Coordination Centre and other remote responders. Finally, as discussed in chapter 21, if the area of SAR action is not within the coverage of an Air Traffic Services (ATS) unit, a fixed-wing aircraft with a SAR-trained crew is likely to be the best choice as Aircraft Coordinator.

2.4 SAR aircraft of all types can be very effective search units, combining a ‘bird’s-eye view’ and, ideally, remote sensing equipment with good area coverage. Radar, emergency beacon detection, infra-red cameras etc are life-saving aids – particularly in the event of an uncontrolled evacuation leaving people in the water or when search objects are scattered.

2.5 At the time of writing, Remotely Piloted Aircraft or Unmanned Aircraft Systems are being widely discussed in the maritime SAR context. It is possible to envisage their use in all the ways briefly discussed above. They have the additional benefit of being able to be used, if necessary, in circumstances which would be

¹ IAMSAR defines a ‘SAR Unit’ or ‘SRU’ as “a unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue operations”.

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too hazardous for an aircraft with crew aboard. They are often cheaper to operate than a manned aircraft and can stay airborne longer: crew fatigue is dealt with by relief at the controlling station, not by having to return the aircraft to base for a crew change. They are likely to bring significant benefits to the communications, surveillance and search aspects of maritime SAR, and it is not too far-fetched to envisage equipment delivery and even rescue roles for them in the future.

3 Aircraft roles in an MRO

3.1 A mass rescue operation is likely to be very complex and to involve a wide mix of maritime, aeronautical and land SAR facilities. While, as discussed in chapter 21, there have been cases in which helicopters have played a leading role in the rescue, it will more usually be the case that aircraft play supporting roles. In the case of fixed-wing aircraft these will usually be in coordination, search and surveillance, as discussed above, plus air-drop capability in some circumstances, delivering equipment etc. Helicopters are probably best thought of as ‘specialist rescuers’ in MROs.

3.2 A helicopter is an excellent piece of SAR equipment – but there is no denying that it needs space, it is noisy, it creates both downwash\(^2\) and distraction, and it cannot rescue very many people at once. Its use should therefore be carefully planned in an MRO, where there are many people in distress and other things going on. The noise of a nearby helicopter can very severely disrupt communications, both face-to-face and by radio, and the noise has been known to disorientate people, especially frightened survivors. The downwash can cause injury or damage and/or interfere with other SAR action. And, for flight safety reasons, only one aircraft is usually able to operate at once in a small area such as the winching areas available on all but the biggest ships. (It should be noted, however, that in specific circumstances such as the evacuation of an offshore installation, with a helideck still operable and experienced controllers and aircrew, helicopter evacuation will be preferable.)

3.3 In general, helicopters are better reserved in MROs for what they are best at: rapid transits and ‘surgical’ delivery and extraction.

3.4 If specialists and/or specialist equipment or supplies are needed to be placed aboard the casualty (see chapter 15) or aboard rescue units to support their crews (see chapters 10 & 22) a helicopter will often be the best way to do it – able to move material and personnel rapidly to the scene and to winch them aboard if landing-on is not an option.

3.5 Similarly, helicopters are good for the rescue of ‘difficult’ cases. As discussed in chapter 8, it is likely to take a significant amount of time and effort to extract an injured or disabled or very elderly person using standard evacuation methods and equipment, and then to transfer them from survival craft into rescue units. If such people are given priority, others will be held up. To be blunt, more – perhaps many more – able-bodied people can be rescued in the same time by standard means than those who are less able.

3.6 A solution to this problem is to use helicopters to remove those who will delay the standard evacuation procedure. It is an added benefit that this will usually also mean that these vulnerable people can be transferred to appropriate care more rapidly because they will already be aboard the helicopter.

\(^2\) Also known as ‘rotor wind’ or ‘down-draught’, this is the downward rush of air generated by the rotors of a hovering helicopter. It can move unsecured items, to the hazard of people in the vicinity – and potentially to the aircraft itself if it sucks loose material into its engines – and it has been known to blow liferafts etc aside; even to capsize them.
Similarly, helicopters may be used to take urgent medical cases off rescue units as they are identified by triage (see chapter 10) and on medical advice, transferring them more quickly to specialist medical care and easing the load on the rescue units’ crews.

It follows that aircraft should be deployed wisely in an MRO. The SMC should move them to forward bases in the early stages, to have them ready for use, but should not send all available air assets straight to the scene as a first reaction – and certainly not before an ACO is appointed. There is no point in having aircraft – helicopters in particular – ‘on hold’ in the area, burning fuel and causing difficulties for other rescue workers if they come close before there is specific work for them to do. Better, if circumstances permit, to move them to forward bases – including offshore installations – where they can shut down and wait for taskings.

In all cases regarding aircraft deployment, the SMC should seek the advice of aeronautical SAR experts as necessary, especially the ACO. The ACO is also responsible for offering unsought advice to the SMC and/or OSC if SAR aircraft taskings are inappropriate or the aircraft can be better used. See chapter 21.

IAMSAR guidance

As noted above, the IAMSAR Manual, especially Volumes II & III, is the primary source of guidance on SAR aircraft operations. IAMSAR Volume II says³, in the context of mass rescue operations, that:

“Helicopter capabilities should be used if available, especially for retrieval of weak or immobile survivors. Aircraft may also be used to deliver equipment and supplies to sustain life pending rescue. Shipping companies are encouraged to equip their vessels with helicopter landing areas or clearly marked hoist-winches to facilitate direct transfers.

“Crew members who may become involved in helicopter hoist operations, including survival craft and surface SAR unit crews, should be made familiar with the usual procedures. See "Vessel/helicopter operations“ in Volume III [Section 16].”

While landing areas may be limited, marked winching areas, clear of obstructions, should be prepared and joint training opportunities should be encouraged, to the benefit of both ships’ and helicopter crews. IAMSAR Volume III should be consulted as regards all aspects of ship / helicopter operations. See also chapters 26 & 28 as regards training and exercises.

IAMSAR includes the following comment on the number of SAR aircraft required⁴:

“In any SAR operation, SMCs should consider the capabilities and the number of aircraft required. Too few aircraft in an operation might prove fatal for persons in distress, while too many can be difficult to organize, increase pilot workload and the risk of collisions. Other factors that might affect the number of aircraft required include the number of casualties, the carrying capacity of participating aircraft, weather conditions on scene, the distance of persons in distress from rescue facilities, the number of evacuation points, the speed at which an evacuation can take place, the speed of participating aircraft, the availability of refuelling facilities, the duration of an operation, aircrew fatigue and other operational factors. Where more aircraft than needed are available some can be held in reserve.”

³ Chapter 6.15.25-26.
⁴ Volume II, Chapter 7.1.5.
4.4 On aircraft capabilities and SAR planning IAMSAR says:

"SMCs should consider how to match different aircraft capabilities to the circumstances and tasks required. For instance, fixed-wing aircraft might be excellent communications platforms and able to carry out searches and ACO duties, but are not capable of rescue hoist operations. SAR helicopters are flexible in their operations, but usually cannot fly as fast, as far, or as high as fixed-wing aircraft and generally need to refuel more often. Remotely Piloted Aircraft (RPA) might have useful reconnaissance and communications capabilities and be able to remain on scene for long periods of time, but some RPA also have a limited radius of operations. In general, for safety reasons, aircraft flown by aircrew and RPA should be kept well apart unless the RPA operator and the aircrew are following agreed operating parameters established in their common State regulations. [...]"

"SMCs should consider the abilities of the crew and aircraft when planning and during operations, so that no tasks are beyond their abilities."

If tasks are given that would require aircraft and aircrew to conduct flying activities “beyond their abilities or their approved types of operations [...] the pilot-in-command shall inform the RCC/OSC/ACO immediately.”

4.5 The SMC, working closely with the OSC and ACO, “should aim to achieve the most effective blend of aircraft and surface unit capabilities and efficient use of aircraft on scene when needed. Minimise situations in which aircraft are airborne without a mission.” Aircraft held in reserve “can provide additional resources if needed, or relieve other aircraft involved in the operation for reasons related to aircrew fatigue or maintenance requirements.”

4.6 Good communication and understanding between SMC, OSC and ACO, and between the ACO and the pilots-in-command of the aircraft responding to the incident, are essential to flight safety and operational success. The coordination of multiple aircraft responding to an MRO is a specialist subject which IAMSAR deals with in detail, and for which potential ACOs should be specifically trained. See chapter 21.

4.7 IAMSAR Volume III Section 10 also includes guidance on the reporting necessary to the ACO’s and aircraft commanders’ situational awareness; on refuelling; and on entering and leaving ‘areas of SAR action’.

"SAR aircraft intending to enter an area of SAR action should normally first contact the relevant unit (RCC, ACO, OSC or responsible ATS unit). They should not enter the area until this unit gives them approval and provides them with sufficient information to safely join the flow of SAR aircraft involved in the operation. [...]"

"Aircraft that are not involved in a SAR operation should normally not fly within areas of SAR action. If such aircraft need to enter an area of SAR action, they should do so only with the approval of a SMC, ACO, OSC or coordinating ATS unit and are subject to the rules of the area or the relevant class of airspace. If a SMC or coordinating ATS unit is giving approval, the ACO or OSC should first be consulted.”

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5 Volume II, Chapter 7.1.6 & 7.1.8.
6 IAMSAR Volume III, Section 10.
7 IAMSAR Volume III, Section 10.
8 IAMSAR defines an ‘area of SAR action’ as “an area of defined dimensions that is established, notified or agreed for the purposes of protecting aircraft during SAR operations and within which SAR operations take place”.
Summary

- Winch-fitted maritime SAR helicopters are a major aid to maritime rescue generally and will certainly have a place in a mass rescue operation – but their best use should be carefully considered. They are probably best thought of as ‘specialist’ rescuers in MROs, providing ‘surgical’ delivery and extraction services.
- Fixed-wing SAR aircraft may be able to deliver support; can cover search areas rapidly and effectively, and make good communications and surveillance platforms. A fixed-wing aircraft with a SAR-trained crew is likely to be the best choice as ACO in areas not covered sufficiently by Air Traffic Services.
- The SMC, working with the OSC and the ACO in particular, should aim to achieve efficient use of aircraft on scene when needed, minimising situations in which aircraft are airborne without a mission. Where more aircraft are available than are needed immediately, some can be held in reserve at forward bases.
- Good communication and understanding between SMC, OSC and ACO, and between the ACO and the pilots-in-command of the aircraft responding to the incident, are essential to flight safety and operational success. All aircraft intending to enter the area of SAR action should do so only with the agreement and under the control of the ACO.
- The IAMSAR Manual should be consulted, and other chapters of this IMRF guidance considered, as regards different parts of the operation; search, rescue, support, coordination and communications.

Further reading

6.1 The reader is referred to the other chapters mentioned in the ‘Discussion of the use of aircraft’ above and, in turn, to the further reading they recommend.

6.2 In general, the IAMSAR Manual provides the main international guidance on the use of SAR facilities; Volume II as regards their choice and coordination, and Volume III as regards their operation.

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