REPORT OF THE THIRTY-SECOND MEETING OF THE ICAO/IMO JOINT WORKING GROUP ON HARMONIZATION OF AERONAUTICAL AND MARITIME SEARCH AND RESCUE

3 to 7 November 2025

1 ADOPTION OF THE AGENDA

1.1 The thirty-second meeting of the International Civil Aviation Organization/International Maritime Organization (ICAO/IMO) Joint Working Group (JWG) on Harmonization of Aeronautical and Maritime Search and Rescue was held in Sydney, Australia, from 3 to 7 November 2025.

1.2 The meeting was chaired by the Vice-Chair, Mr. Tai Kit (Singapore).

1.3 Participants received a traditional 'Welcome to Country' by Mr. Craig Madden from the Metropolitan Local Aboriginal Land Council, before a welcome was extended to all members and observers by the host of the meeting, represented by Ms. Kaylene Dale, Chief Executive Officer, Australian Maritime Safety Authority.

1.4 The meeting recalled that the JWG was established in 1993, with the objective of assisting ICAO and IMO in developing provisions regarding new search and rescue (SAR) techniques and procedures where both aeronautical and maritime interests were involved.

1.5 The meeting also recalled the JWG guidelines, as reaffirmed by ICAO and IMO, as follows:

.1 members were expected to serve as individual SAR experts rather than State representatives;

.2 the JWG had no power to make recommendations to States, nor to any organization other than ICAO and IMO;

.3 recommendations from the JWG were made directly to both organizations; and

.4 representatives of other organizations or States might attend the JWG and participate as observers, however, meeting announcements and documentation relating to the JWG would only be distributed to the members and observers invited to attend by the JWG and others who request advance notification.

1.6 The JWG further recalled that it consisted of eight aeronautical and eight maritime members and that others were invited to participate as observers. Observers, being SAR experts, were invited to contribute to the discussions, as appropriate.

1.7 The JWG noted that deadlines for registration and submission of documents were required and needed to be adhered to, to allow the secretariats and the fellow members of the JWG to have appropriate time to organize matters and be fully prepared for the meeting. The JWG also recalled the establishment of the commenting document mechanism since JWG 27, which enabled more efficient consideration and resolution of any comments, objections or proposals and contributed to the quality of the discussions.

1.8 The members and observers who participated at this meeting of the JWG are listed in **appendix 1**.

1.9 The JWG noted **IP.1**, containing the provisional agenda for this meeting and adopted the agenda without changes to it. The JWG noted the identification by the Chair that discussion of how the JWG can continue to advance the overall SAR system, assist States in implementing improvements to their SAR services and make good use of new SAR technologies would be critical during this meeting, which marked the second of the three year cycle in proposing amendments to the IAMSAR Manual.

2 DECISIONS OF ICAO AND IMO BODIES RELATED TO THE JOINT WORKING GROUP WORK

2.1 Terms of reference of the JWG

2.1.1 The JWG noted that its terms of reference were set out in the invitation letter (IMO Circular Letter No.5045, dated 1 July 2025).

2.2 Outcome of IMO activities

2.2.1 The JWG noted in general the information provided by the IMO Secretariat (**WP.1**) on the outcomes of the 109th and 110th sessions of the Maritime Safety Committee (MSC) and the twelfth session of the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR 12) and took action as indicated in the following paragraphs and relevant agenda items.

Matters related to workload

2.2.2 The JWG noted the decision of MSC that IMO-related matters considered by the JWG should remain within the scope of existing outputs approved by IMO, unless instructed otherwise by the NCSR Sub-Committee or the Committee.

Work carried out by the JWG

2.2.3 The JWG noted that NCSR 12 had instructed the JWG to:

.1 continue to work on the guidance on psychology of emergency, with focus on the management level, as appropriate, limiting the volume of content to introduce general key elements into the IAMSAR Manual, and advise the Sub-Committee, as appropriate (see also paragraph 4.2);

.2 consider the development of an IMO circular on psychology of emergency once the related amendments to the IAMSAR Manual had been finalized (see also paragraph 4.2.5);

.3 continue to work on the matter of optimizing homing operations for 406 MHz distress beacon and AIS signals, ensuring that draft amendments to be developed were concise and within the scope of work of the output for amendments to the IAMSAR Manual, and advise the Sub-Committee, as appropriate, noting the invitation by NCSR to IMO Member States to review the application of the homing capability of the SAR units for 406 MHz distress beacon and AIS signals in SAR operations and contribute to the work of the JWG accordingly (see also paragraph 2.2.6);

.4 continue to work on the guidance on submarines and passenger submersible craft and related SAR issues and advise the Sub-Committee, as appropriate (see also paragraph 9.4);

.5 continue the work on the refinement of the general overview of SAR issues initiative within the scope of its work, and advise the Sub-Committee, as appropriate (see also paragraph 5.1);

.6 consider the proposed amendments to IAMSAR Manual, Volume I to include a SAR communications and information management guide and a guide on periodic verification of contacts, and advise the Sub-Committee, as appropriate (WP.2) (see also paragraph 5.4); and

.7 consider ways of assisting IMO Member States in completing the information in the Global SAR Plan module of the Global Integrated Shipping Information System (GISIS) and keeping it updated (see also paragraphs 2.2.4 to 2.2.5).

2.2.4 Following a presentation by the IMO Secretariat on the Global SAR Plan module, the JWG noted:

.1 the new function implemented for reporting arrangements concerning the dissemination of SAR related information over enhanced group call (EGC) services, including the designation of RCC(s) having direct access to the EGC systems for dissemination of such information; and

.2 the approval of COMSAR.1/Circ.61 on *Guidance for entering and updating information on search and rescue services into the Global SAR Plan and on how to get access to the information for operational use.*

2.2.5 With regard to ways of assisting IMO Member States in completing the information in the Global SAR Plan, the JWG noted the following views:

.1 COMSAR.1/Circ.61, which already contained necessary information, could be better publicized to reach SAR authorities responsible for providing such information;

.2 existing meeting platforms, such as regular regional workshops, could be used to remind Member States of the need to keep the information in the Global SAR Plan updated; and

.3 setting a deadline to communicate or update the required information in the Global SAR Plan could prompt Member States to take the necessary actions. This could also be complemented by implementing the system's automated notifications to remind responsible authorities to periodically verify the information.

2.2.6 With regard to the work on the matter of optimizing homing operations for 406 MHz distress beacon and AIS signals, the JWG noted that while no proposals to amend the IAMSAR Manual had been submitted, the work continued intersessionally.

Other matters

2.2.7 The JWG noted the validation by NCSR 12 of Model Course 3.14 on SAR Mission Coordinator (IAMSAR Manual, Volume II) and the establishment of a review group on Revision of Model Course 3.15 on SAR On-scene Coordinator (IAMSAR Manual, Volume III), and encouraged JWG participants to collaborate with the review of the Model Course. In this regard, the JWG noted that the Review Group had a new Coordinator[1].

2.2.8 The JWG noted that NCSR 12, in response from the request made by JWG 31, had confirmed the understanding that SAR services were not required to conduct searches for craft with no persons on board, and that distress beacons should not be used for alerting on craft with no persons on board.

2.2.9 The JWG noted further the work on the Comprehensive review of the 1978 STCW Convention and Code relating to search and rescue, which would be further considered at HTW 12 (23 to 27 February 2026), with a view to determining if reduction and combination of requirements for SAR was appropriate. Recognizing the importance of maintaining the necessary SAR skills of seafarers, the JWG encouraged its participants to contribute to discussion of this matter at HTW 12.

2.3 Outcome of ICAO activities

2.3.1 The JWG noted the information provided by the ICAO Secretariat (**WP.3**) on work undertaken in ICAO since JWG 31.

2.3.2 The JWG noted that ICAO State letter AN 11/1.1.29 – 24/16, dated 25 June 2024, had informed States of the operational availability of the LADR, and also noted that the *Manual on Global Aeronautical Distress and Safety System (GADSS)* (Doc 10165) had been published. The JWG also noted that a copy of the LADR user manual, as developed by EUROCONTROL, was available through the LADR and also the JWG website.

3 CONVENTIONS, PLANS, MANUALS AND OTHER DOCUMENTS AFFECTING SAR

Amendments to the IAMSAR Manual

3.1 Autonomous distress tracking of aircraft in flight

3.1.1 Continuing its consideration of **WP.3**, the JWG recalled (JWG-SAR/31-11, paragraph 2.3.3) that the ICAO Secretariat had undertaken to present draft amendments to the IAMSAR Manual to JWG 32, based upon experience gained with operational usage of the LADR.

3.1.2 After discussion, the JWG agreed to the draft amendments to Volume II for inclusion in the 2028 edition of the Manual, as set out in **appendix 4**.

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[1] Mr. Niall Ferns, Niall.Ferns@transport.gov.ie

3.2 Editorial improvement

3.2.1 The JWG considered the information provided by the IMO Secretariat (**WP.20**) regarding the editorial work towards improvement of the IAMSAR Manual, in particular, in relation to the abbreviations, acronyms and glossary list; appendices in general; and other editorial issues that might benefit from harmonization within and among the volumes.

3.2.2 The JWG noted the consolidation of separate lists of abbreviations and acronyms and the glossary in the 2025 edition of the IAMSAR Manual, which were previously attached to each volume into common lists identical across all three volumes. The JWG further noted that these lists were provided in annexes 1 and 2, respectively, to WP.20, in a copyable format to facilitate future potential amendments of these lists for the 2028 edition of the Manual.

3.2.3 The JWG noted that a list of elements to be considered when drafting amendments or new text for future editions of the IAMSAR Manual had been prepared to provide the JWG with a consolidated set of considerations and recommendations to ensure that both print and digital editions of the IAMSAR Manual were aligned with current editorial best practice, as set out in annex 3 to WP.20. The JWG further noted that said annex was intended to guide future revisions of the Manual to optimize its digital use and to be accessible to a wider audience, and that the 2025 edition of the IAMSAR Manual had been prepared for publication on the new IMO digital platform and was available for the first time to users in HTML format.

3.2.4 Regarding the content and volume of appendices, the JWG noted the need to maintain a concise Manual. Since the inception of the Manual, new content had been considered for inclusion, which had often led to the addition of new appendices. The JWG noted the view that although additional information could be useful, producing this within the main contents of the publication might not be necessary, and indeed might hinder the usefulness of the Manual as a concise resource. The Manual should not be considered a compendium/encyclopaedia that reproduces a full suite of all SAR matters.

3.2.5 The JWG noted the view that, in particular, Volume II, might have grown such that it might hamper usability with the additional details currently found with the suite of 23 appendices lined up in the historical order of being added, rather than corresponding with the order of chapters in the main text. It was also recalled that amendments to the Manual, in particular those of a bulky nature, should be carefully considered, and that consequential amendments such as the impact on references of paragraph renumbering should aways be kept in mind by proponents.

3.2.6 In this light, the JWG considered the possibility of transferring some content to IMO circulars or model course(s). The JWG also noted that ICAO did not have equivalent mechanisms for the publication of material removed from the Manual, and that ICAO Assembly Resolution A39-22 limited editorial amendments to only those that were essential.

3.2.7 After consideration, the JWG agreed that the amendment editorial group, under the coordination of the United Kingdom[2] would review the appendices and consider if any material could be better positioned in IMO circulars or model courses, as well as suggestions for necessary actions to improve the usability of the IAMSAR Manual, and report to JWG 33, with a view to any necessary amendments being proposed for the 2031 edition.

[2] Mr. Mark Chamberlain, mark.chamberlain@mcga.gov.uk

3.3 Ship security alert system (SSAS)

3.3.1 The JWG considered a proposal from China (**WP.13**) proposing amendments to IAMSAR Manual Volume III, in respect of the activation points of the ship security alert system (SSAS), to be consistent with the provisions of chapter XI-2 of the SOLAS Convention.

3.3.2 During the consideration, the following views were expressed that:

.1 after a review of the IMO SSAS requirements MSC 136(76) and MSC 147(77), there appeared to be further inconsistencies with the IAMSAR Manual, for example IAMSAR specifically recommended a concealed push button while performance standards only referred to activation points. As such, consideration of further alignment might be needed; and

.2 IAMSAR Manual, Volume III, chapter 4 contained information for vessel emergencies at sea, but most of the guidance was not SAR-related, thus perhaps chapter 4 could be better placed in a different IMO document.

3.3.3 Notwithstanding the above views, the JWG agreed to the draft amendments to Volume III for inclusion in the 2028 edition of the Manual, as set out in **appendix 5**. The JWG further noted that there might be a need to consider further amendment of chapter 4 in light of the views above.

3.4 Ship reporting systems

3.4.1 The JWG considered the proposal from Australia (**WP.22)** to update the details in IAMSAR Manual Volume II, appendix O, regarding Australian Ship Reporting System for SAR. This appendix contained the list of some, but not all, ship reporting systems operating at the time in the world for SAR purposes.

3.4.2 The JWG noted a view that the information contained within appendix O was not widely used by SAR services, now that ship tracking tools such as AIS and LRIT had become widely available, and agreed that appendix O should be considered for removal from the Manual as part of the work related to review of the appendices, to be undertaken by the amendment editorial group as per paragraph 3.2.7 above.

3.4.3 After discussion, the JWG agreed to the draft amendments to Volume II for inclusion in the 2028 edition of the Manual, as set out in **appendix 4**. The JWG also agreed that a review of the ship reporting systems for SAR listed in IAMSAR Manual Volume II, appendix O would be beneficial, noting that many of them might have become obsolete.

3.5 Search planning and evaluation concepts

3.5.1 Recalling that, since JWG 26, New Zealand had been coordinating work reviewing the IAMSAR Manual Volume II, chapter 4 – Search Planning and Evaluation Concepts and related appendices, the JWG considered the resulting proposals presented by New Zealand (**WP.17**).

3.5.2 During the ensuing discussion, the JWG noted views that:

.1 some topics might require more discussion or research, making incorporation into the 2028 edition of the Manual an ambitious target;

.2 recalling paragraph 3.2.6 above, the JWG should be mindful of too many editorial amendments focussed on dates in samples;

.3 dividing chapter 4 into “Search planning basics” and “Advanced calculations” sections, perhaps with the latter being separated from Volume II, would offer improved user-friendliness; and

.4 while use of computer-modelled search planning was increasingly common, amendments to chapter 4 should not inadvertently encourage States to reduce training in manual search planning, in order to mitigate scenarios of computer failures and to ensure that search planning fundamental principles continued to be taught.

3.5.3 After discussion, the JWG agreed to the draft amendments to appendices J, L and Q of Volume II for inclusion in the 2028 edition of the Manual, as set out in **appendix 4**.

3.5.4 The JWG also agreed to continue the ad hoc correspondence group under the coordination of New Zealand[3], to further refine the draft amendments for appendices K and N, and report to JWG 33.

3.5.5 The JWG further agreed that the correspondence group consider ways to make the contents of the search planning chapter in Volume II, including relevant appendices, more concise, with a view to inclusion in the 2031 edition of the Manual. Such consideration should include the possibility of separating the material used for advanced calculations from Volume II.

3.5.6 Furthermore, the JWG invited participants to take a proactive role in developing standard functional requirements and methodologies for Computer Based Search Planning Aids. The JWG encouraged participants to participate in the ad hoc correspondence group, and to submit working papers outlining a streamlined technique for search planning as an alternative to the current IAMSAR method.

3.6 Search planning tables

3.6.1 The JWG considered a proposal from Finland (**WP.14**) concerning amendments to IAMSAR Manual Volume II, in respect of search planning tables. The JWG recalled that during discussion on sweep width tables for ‘merchant vessels’ (JWG-SAR/31-WP.2), the JWG had noted that similar revision should be made to other tables.

3.6.2 During the ensuing discussion, the JWG noted that:

.1 research into the original development of the tables would be required in order to provide a sound understanding of proposals for amendment;

.2 the introduction of remotely piloted aircraft systems (RPAS) or unmanned aerial vehicles (UAS) for SAR, and the use of electro-optical sensors and artificial intelligence, might impact the content of the tables;

.3 fix error and dead reckoning error tables (N-2 and N-3) might no longer be appropriate, given the proliferation of GNSS-based navigation systems; and

.4 obtaining data and information for sensors and placing that into a table could be a challenge since sensors from different manufacturers were quoted with different capabilities, and information might not be available at all if the devices were of military origin.

[3] Mr. Neville Blakemore, neville.blakemore@maritimenz.govt.nz

3.6.3 After discussion, the JWG agreed that further consideration was required for the harmonization of the tables, including consideration of terminology when categorizing the size of aircraft in the tables. The JWG further agreed that this topic should be considered by the ad hoc correspondence group under the coordination of New Zealand, as established by paragraph 3.5.4, with a view to inclusion of any material in the 2031 edition of the Manual.

3.7 RPAS in SAR

3.7.1 The JWG noted the proposal from the United States (**WP.4**) that a discussion was needed to establish a framework for content within a future edition of the IAMSAR Manual on remotely piloted aircraft and other autonomous craft.

3.7.2 During the ensuing discussion, the following views were expressed, that:

.1 stakeholders needed to understand the difference between "nobody on board" and "remotely/autonomously piloted";

.2 the difference between RPAS and UAS needed to be well understood by those considering such a framework;

.3 UAS operations were valuable for SAR, and were in use in some regions for such applications as monitoring for unsafe mixed migration by sea;

.4 UAS often could provide search, but currently could not provide rescue;

.5 any such framework should consider incorporation of concepts including:

  .1 the accepted notion that SAR services only respond where there were persons on board;

  .2 that advanced air mobility (AAM) could be one solution for providing rescue;

  .3 that RCCs would need some way of establishing whether there were persons on board such craft;

  .4 guidance on how to construct search plans using UAS;

  .5 how to assign crewed and uncrewed assets;

  .6 methods of segregating crewed and uncrewed craft;

  .7 what search integrity would be available from such craft; and

  .8 probability of detection available from such craft.

3.7.3 The JWG noted that the 42nd session of the ICAO Assembly (A42) had acknowledged the current framework of the *Convention on International Civil Aviation* (Doc 7300), and more specifically certain provisions of its Annexes, as presenting challenges for, if not necessarily insurmountable obstacles to, UAS operations over the high seas, which can inhibit States from authorizing said operations in a lawful manner. A42 noted the need for a long-term framework, requested that ICAO develop an interim solution to enable States to lawfully authorize such operations, both in a manner commensurate with risk and, in the meantime, confirm the obligation and prerogative of States to identify the legal basis on which compliant operations may be conducted today, pending and subject to the adoption of interim and more enduring provisions.

The ICAO Council was urged to develop and adopt, ideally before the end of 2026, an interim framework which would be outcome-based, consistent with the intent of, and compliant with, the Chicago Convention, such as through acceptable means of compliance.

3.7.4 After discussion, the JWG agreed to consider this subject in light of the interim framework, when available.

3.7.5 The JWG noted the information presented by Norway (**IP.3**) regarding air coordination of manned and unmanned aircraft, and noted that RPAS were unable to operate under visual flight rules (VFR). Further noting that the *Manual on Remotely Piloted Aircraft Systems (RPAS)* (Doc 10019) contained guidance on the integration of RPAS with traditional aviation, the JWG agreed that the information should be considered as part of any work arising from paragraph 3.7.4 above.

4 SAR OPERATIONAL PRINCIPLES, PROCEDURES AND TECHNIQUES

4.1 Autonomous Distress Tracking

4.1.1 The JWG considered the information provided by United States (**WP.5**) concerning autonomous distress tracking (ADT) and the provision of information from such devices to the location of an aircraft in distress repository (LADR), and thence to RCCs.

4.1.2 The JWG noted with concern that to date, all ADT activations had arisen from aircraft in non-distress situations, with the vast majority occurring while the aircraft was not in flight.

4.1.3 The JWG also noted that the 42nd session of the ICAO Assembly, had urged Member States to mitigate non-distress activations of ELT(DT)s through coordinated efforts from civil aviation authorities, airline operators, aircraft manufacturers and maintenance facilities.

4.1.4 The JWG noted further the information provided by France, as the first mission control centre (MCC) to provide data to the LADR on behalf of the Cospas-Sarsat System, related to non-distress activations of ELT(DT)s, which illustrated the growing scale of the issue. An interactive map had been developed for use within the French MCC which showed all ELT(DT) activations received. Almost 2000 activations had been received during the ten months of data collection. Analysis of data related to the activations suggested that the aircraft manufacturer was best placed to mitigate against non-distress activations, as part of the integration of the ELT(DT) into the avionics systems. Nevertheless, other stakeholders such as civil aviation authorities, aircraft operators and maintenance facilities should remain involved in attempts to reduce non-distress activations. Collection of data related to the non-distress activations had allowed the French MCC to engage with such stakeholders in order to suggest and seek mitigation efforts. Pursuit of these efforts had resulted in a decrease in the rate of non-distress activations.

4.1.5 During the ensuing discussion, the following views were expressed that:

.1 only data from ELT(DT)s was transmitted via the Cospas-Sarsat system, data from other ADT devices reached the LADR through other means;

.2 ELT(DT) behaviour when activated differed from that of ELTs, due to delay of activation and high transmission rate;

.3 a one-day tabletop exercise facilitated by the United Kingdom and involving aircraft operators, ATS units and RCCs had been conducted, which revealed that some stakeholders were uncertain who should conduct verification of the ADT activation;

.4 LADR was a repository of position information, and was not intended to be an alerting system;

.5 numbers of ELT(DT)s being registered were increasing with deliveries of new aircraft, and false alert rates were increasing in line;

.6 materials had been developed by Cospas-Sarsat to aid education around prevention of inadvertent activations;

.7 manufacturers of ELT(DT)s and aircraft might need to verify the avionics to beacon interface software, given that the beacons should only activate automatically while in flight; and

.8 that LADR seemed only fed with aircraft 24-bit address and operator three letter designator due to limited ELT(DT) digital message capacity, making identification of the particular flight more challenging. Some RCCs were overcoming this using third party applications such as flightradar24.

4.1.6 After discussion, the JWG invited participants to consider sharing experiences related to ADT through working or information papers to future meetings.

4.2 Psychology of emergency

4.2.1 The JWG recalled previous discussions regarding psychology of emergency and that JWG 28 had agreed that SAR personnel could benefit from further detailed guidelines on psychological first aid. Accordingly, JWG 31 had formed an ad hoc correspondence group, under the coordination of Chile, to further consider the matter and report to JWG 32.

4.2.2 In this context, the JWG considered the information provided by Chile (**WP.6**) proposing amendments to IAMSAR Manual.

4.2.3 During ensuing discussion, the following views were expressed that:

.1 regarding the possibility of an IMO circular related to psychology of emergency, such would not be received by ARCCs, and so should be limited to material of relevance only to maritime SAR;

.2 the reduction in volume of material proposed since the review of JWG 31 WP.13 had met the instruction of NCSR to make the guidance high-level;

.3 prevention of post-traumatic stress injuries was a challenge, especially for RCCs in the operational context, rather pre-event resilience needed to be built; and

.4 the wording should prevent requirements being placed inadvertently on the RCC, rather should refer to the SAR service.

4.2.4 The JWG also recalled (JWG SAR 30/11, paragraph 4.1.3) that several States already had psychological assistance programmes in place, including Canada (Road to Mental Readiness, R2MR), South Africa (Mayday-SA, in partnership with Stiftung Mayday, of Germany), and the

United Kingdom (TRiM, Trauma Risk Management). Further, IMRF had implemented the programme SARyouOK.

4.2.5 After discussion, the JWG agreed to the draft amendments to Volume I, II and III for inclusion in the 2028 edition of the Manual, as set out in **appendices 3, 4 and 5**. The JWG also agreed that development of a separate IMO circular was not warranted at this time.

4.3 Mobile telephone detection

4.3.1 The JWG noted the information provided by Norway (**IP.4**) concerning the experience of the Norwegian Rescue Services regarding the use of Mobile Phone Detection and Location System (MPDLS). The JWG also noted information from Canada and Sweden that various of their SRUs also carried this technology, which had proven to be useful.

5 SAR SYSTEM ADMINISTRATION, ORGANIZATION AND IMPLEMENTATION METHODS

5.1 General SAR overview

5.1.1 The JWG recalled that JWG 30 had discussed a proposal by Australia (JWG-SAR/30 WP.32) for a mechanism to assist the JWG with the establishment and maintenance of a strategic outlook on new and emerging issues that might impact the global aeronautical and maritime SAR system operating environment. The JWG noted that NCSR 12 had agreed that, to avoid any misperception as to the setting of strategic plans, the initiative should be retitled as "General overview of SAR issues", noting that where the JWG considered that any SAR issues warranted action outside its existing remit, then the JWG would recommend those issues be considered by ICAO, and/or the IMO NCSR Sub-Committee, as appropriate.

5.1.2 The JWG noted the refinements proposed to the updated overview by Australia (**WP.8**). During the ensuing discussion, the following views were expressed, that:

.1 the document should be considered a ‘living document’ and be updated as needed;

.2 an awareness of possible future issues gave the JWG the opportunity to increase its preparedness for emerging SAR issues;

.3 the general overview of SAR issues document could present an opportunity for new participants to familiarize themselves with topics which they might like to consider for submission of papers;

.4 review of the overview every three years, during the first year of the IAMSAR amendment cycle, would encourage efficiency; and

.5 maintaining the overview as an internal JWG document would minimize impact on workload and translation for the Secretariat.

5.1.3 After discussion, the JWG noted the General overview of SAR issues, as set out in WP.8. The JWG agreed that the general overview would be hosted on the JWG website on the ICAO secure portal and reviewed as necessary, ideally during the first year of the IAMSAR amendment cycle.

5.2 Aeronautical SAR oversight

5.2.1 The JWG considered the information provided by Australia (**WP.15**) concerning effective implementation of oversight of SAR services. The JWG noted that ICAO's triennial Universal Safety Oversight Audit Program (USOAP) Continuous Monitoring Approach (CMA) Results Report 2019-2021, section 4.7.2, stated:

> "Among the air navigation services, SAR is still the service that represents a major challenge for the States performing (the) safety oversight function, mainly because SAR is a State function that often integrates several State entities and the role of the regulator is not clearly defined among them. The lack of clarity or definition of the role of a safety oversight authority for SAR thus obscures the lack of implementation of ICAO provisions…"

5.2.2 The JWG noted that since the publication of WP.15, the USOAP CMA Results Report 2021-2024 had been published, which stated in section 4.7.2:

> "Among the services in air navigation, search and rescue (SAR) continues to represent the major challenge for States when performing their safety oversight function. The overall EI of respective PQs is below 50 per cent and a further breakdown shows that only 33 per cent of States ensure that their SAR organization coordinates with those of neighbouring States, and 45 percent perform surveillance effectively."

5.2.3 The JWG also noted that the USOAP CMA Results Report 2016-2018 stated that more than 50 per cent of States did not effectively conduct surveillance over their SAR services.

5.2.4 The JWG also noted that implementation of ICAO SAR oversight requirements was complicated by variations in how States had chosen to provide their aeronautical SAR services, which might be delegated by the State to entities such as air navigation services providers, civil aviation authorities (CAAs), civil maritime authorities, coast guards, the military, and so on. There were also challenges for States with JRCCs which needed to contend with the different audit approaches for SAR services used by the ICAO USOAP CMA and IMO IMSAS for their respective aeronautical and maritime SAR service components.

5.2.5 During the ensuing discussion, the following views were expressed that:

.1 given the relatively small work force employed in SAR, challenges were often encountered in trying to find a SAR inspectorate that was not already employed in the SAR system;

.2 the ICAO EUR SAR TF had published EUR Doc 044, which contained a training programme for SAR inspectorate staff, and a SAR inspector's handbook, nevertheless the EUR SAR TF had encountered challenges in finding examples of inspectorates that fully conformed to the ICAO requirements;

.3 since SAR formed part of the ANS audit area, some States used their ANS inspectorate to assist with SAR oversight, especially by providing inspector experience in combination with SAR experts;

.4 clearer guidance on what constitutes independent regulated oversight was required;

.5 alternative means of compliance with USOAP protocol questions would be welcomed;

.6 regulated oversight for areas not under the purview of the civil aviation authority was a challenge; and

.7 due to the generally low levels of effective implementation observed, examples of successful State SAR oversight may be challenging to find and name. Rather, a more successful course of action may be to develop several oversight systems arrangements in fictitious scenarios, following Annex 19 — *Safety Management* and the *Safety Oversight Manual* (Doc 9734), which would also allow for the differences in SAR arrangements worldwide.

5.2.6 After discussion, the JWG agreed to the formation of an ad-hoc correspondence group, under the coordination of Australia[4], to consider development of proposals for possible aeronautical SAR service oversight systems.

5.3 SAR system cybersecurity

5.3.1 The JWG considered the information provided by Australia (**WP.11**) concerning potential cyber security disruptions specific to the SAR system. In this regard, the JWG noted that work related to GNSS radio frequency interference (RFI), arising from Recommendation 2.2/2 of the Fourteenth Air Navigation Conference (AN-Conf/14), was underway within ICAO. The JWG also noted that MSC 110 had completed the output regarding cybersecurity by approving MSC-FAL.1/Circ.3/Rev.3, issued on 4 April 2025 and had endorsed the conclusion that a non-mandatory cybersecurity Code should be developed, and had invited interested Member States and international organizations to submit proposals for a new output in this regard to MSC 111.

5.3.2 During the ensuing discussion, the following views were expressed, that:

.1 the most efficient means to progress work regarding cybersecurity for SAR might be to elaborate on the result of work arising from Recommendation 2.2/2 of AN-Conf/14 (paragraph 5.3.1 refers);

.2 issues had been observed with GNSS locations provided by distress beacons not being consistent with the independent locations processed, and actions were underway within Cospas-Sarsat to address this; and

.3 training was essential to ensure SAR personnel understood cybersecurity challenges such as issues caused by GNSS RFI.

5.3.3 After discussion, the JWG agreed to share views on cyber security matters specific to SAR at JWG 33, and invited its participants to participate in the discussion in relevant IMO bodies.

5.4 Communication arrangements between RCCs

5.4.1 The JWG considered the information provided by the IMO Secretariat (**WP.2**) concerning a proposal to amend IAMSAR Manual, Volume I to include a SAR communications and information management guide and a guide on periodic verification of contacts (MSC 109/13/7).

[4] Mr. Scott Constable, scott.constable@amsa.gov.au

The JWG noted that NCSR 12 had instructed the JWG to consider the proposal and advise the Sub-Committee, as appropriate.

5.4.2 During the ensuing discussion, the following views were expressed, that:

.1 some of the concepts were supported, however, much of the content was already present in the IAMSAR Manual in other forms;

.2 the lack of introductory text indicated that the proposal was not yet fully mature for inclusion in the IAMSAR Manual;

.3 the proposed text, while forming a reasonable local solution, was too extensive for global application and might be better placed in a regional SAR plan; and

.4 while a lack of SAR agreements around the world was a significant issue, which ICAO and IMO were working to address, a formal agreement should not be required in order for RCCs to contact each other, particularly at the working level.

5.4.3 After discussion, the JWG agreed that the material was not suitable for inclusion in the IAMSAR Manual, rather would be better placed in a regional SAR plan.

5.5 Regional working group updates

5.5.1 The JWG noted the information provided by Singapore (**IP.5**) and Serbia (**IP.8**) regarding the work carried out by the ICAO Asia-Pacific Regional SAR Work Group (APSAR/WG) and European Regional SAR Task Force (EUR SAR TF), respectively. The JWG noted in particular that version 5.0 of the Asia/Pacific SAR Plan had been adopted, and that SAR workshops were planned for 19 to 21 November 2025 (Paris, France; EUR-ACAO SAR Workshop) and the first or second week of May 2026 (Asia/Pacific, in conjunction with APSAR/WG/11).

6 RCC/RSC EQUIPMENT AND FACILITY DESIGNATIONS AND STANDARDS

6.1 SRU search plan ingestion

6.1.1 The JWG considered the information provided by United Kingdom (**WP.10**) proposing a standardization effort aligned with IAMSAR, SOLAS, and IMO performance standards to ensure consistency across flight management systems (FMS), GPS, and electronic chart display and information system (ECDIS) platforms. The JWG noted that the identified issues with search plan ingestion had been shown to reduce the area searched to as little as 11% of the intended area, reducing the chance of successful search, and potentially placing the SRU at risk.

6.1.2 During the ensuing discussion, the following views were expressed, that:

.1 the Canadian Coast Guard had issued a circular to ensure that RCCs and SRUs were aware of the issue, and was working towards a wider distribution of the information;

.2 forward fit requirements might form part of the solution, since retrofit often posed challenges;

.3 this issue had been raised at previous meetings of the JWG without resolution;

.4 while it was true unless the flight path of an aircraft was monitored during the search SAR mission coordinators (SMCs) might never realize that the pattern completed was not the one intended, this issue could perhaps be overcome through use of technology such as ADS-B and AIS;

.5 the workload generated by the reorganizing of non-conforming searches was a significant distraction and operational burden on the SMC

.6 performance standards for FMS, which could impact the interpretation and execution of search patterns, were set by bodies such as EUROCAE or RTCA rather than by ICAO; and

.7 any such standard would be a challenge to draft, for reasons including the difference in navigation methods employed by ships and aircraft and the multitude of navigation systems available.

6.1.3 After discussion, the JWG established an ad hoc correspondence group under the coordination of United Kingdom[5] to investigate the feasibility of adopting a unified format standard across platforms for manual and automated/digital data entry to electronic navigation systems and the possibility of a standardized schema for search pattern input and output.

6.2 Radar SART and AIS-SART

6.2.1 The JWG considered the information presented by IMRF (**WP.16**) concerning responses to radar search and rescue transponders (SART) and AIS search and rescue transmitters (AIS-SART), with the aim of reducing the risk that responding vessels and aircraft not detecting such locating aids.

6.2.2. The JWG recalled that MSC 109 had approved SN.1/Circ.345 on *Difficulties and risks involved in the setting of radar displays to correctly visualize radar SAR transponder (SART) signals* and that a new output would be required to discuss a long-term solution to address the potential difficulties with the setting of radar displays.

6.2.3 After discussion, the JWG established an ad hoc correspondence group under the coordination of IMRF[6] to develop proposals for amendment of the IAMSAR Manual relating to means by which to obtain the best performance from radar SART and AIS-SART within the scope as described in paragraph 2.3 of WP.16, taking into account the above decision of MSC 109.

6.3 AIS SAR aircraft symbology

6.3.1 The JWG considered the information presented by Australia (**WP.19**) concerning the portrayal of AIS SAR aircraft symbology and duplication of maritime identities on ships' navigation displays.

6.3.2 The JWG noted that during discussions to revise Recommendation ITU-R M.585-9 in May 2025, the ITU-R Working Group 5B became aware of certain issues related to the presentation of AIS SAR aircraft information and duplicate maritime identities on shipborne navigational displays, as governed by IEC 62288:2021 — *Maritime navigation and radiocommunication equipment and systems – Presentation of navigation-related information on*

[5] Mr. Mark Chamberlain, mark.chamberlain@mcga.gov.uk

[6] Mr. Roland McKie, r.mckie@imrf.org.uk

shipborne navigational displays: General requirements, methods of testing and required test results. Namely, no symbol appears to have been designated when the MMSI seventh digit equals 0. Consequently, AIS responses from SAR aircraft having an MMSI between 111 MID 001 and 111 MID 099 might not be shown on a ship's navigation display.

6.3.3 During the ensuing discussion, the following views were expressed, that:

.1 it had been identified that there might be confusion between use of the AIS format and the regular MMSI format. The AIS format started with the code as 111, 974, 972, etc., whereas the regular MMSI format started with the country code (200 – 780). If the AIS format was used mistakenly to encode 406 MHz beacons, the first three digits would be interpreted as the country code, and the message could be considered invalid. Therefore, only the regular MMSI format should be used to encode EPIRBS; and

.2 IMO *Guidelines for the presentation of navigational-related symbols, terms and abbreviations* (SN.1/Circ.243/Rev.2) defined the symbol for AIS SAR aircraft in a generic manner without the option for a helicopter symbol. Whether to create another symbol for AIS SAR aircraft – helicopter might need to be decided by the NCSR Sub-Committee.

6.3.4 After discussion, the JWG invited participants to consider submitting information relating to portrayal of AIS SAR aircraft information symbology and duplicate maritime identities on ships navigation displays and any related information to JWG 33 to inform further discussion. With regard to the duplicate maritime identities on ships navigation displays, participants were also invited to participate in relevant ITU bodies for their appropriate action.

7 SAR COMMUNICATIONS

7.1 International Cospas-Sarsat Programme

7.1.1 The JWG noted the information provided by Cospas-Sarsat (**WP.18**) on the status of the International Cospas-Sarsat Programme as of 15 September 2025.

7.1.2 The JWG noted with concern that there was a concentration of no- or low-response rate countries, in particular, around the equator in Africa, and thus receiving the updated information on the continued SPOC testing remained relevant.

7.1.3 During the consideration of MCC-SPOC agreements, the JWG noted that the title of the agreement could be altered from the template, for example as "protocol" or "arrangement", as required by the signatories. Similar consideration could be given to the text of such.

7.1.4 The JWG noted that Cospas-Sarsat planned to more fully report on ELT(DT) matters (including beacon population, registration rate, and real and inadvertent activations) that occurred in 2025 at the next JWG meeting, if such data was reported by participants.

7.1.5 The JWG noted the establishment of the Cospas-Sarsat Global SAR day on 10 September each year, coincident with the anniversary of the first 'save' made with the support of the Programme in 1982.

7.1.6 The JWG participants were invited to liaise with the Cospas-Sarsat Secretariat[7] to provide details of any existing MCC-SPOC agreements/arrangements, and proposals for improving MCC-SPOC communications during tests and real alerts. They were also invited to consider participating in the development of two-way communication capability for 406 MHz beacons by joining the relevant correspondence working group.

8 SAR PERSONNEL STAFFING AND TRAINING

8.1 406 MHz direction finding training

8.1.1 The JWG considered the information provided by Australia (**WP.9**) regarding the use of test protocol coded 406 MHz beacons for the direction finding training of SRUs. The JWG noted the procedure in place in Australia to seek approval to activate the test beacon from the Australian MCC, and to notify JRCC Australia, in order to avoid risk of overloading the Cospas-Sarsat satellite system capacity.

8.1.2 During the ensuing discussion, the following views were expressed, that:

.1 406 MHz was declared by ITU as a ground-to-satellite frequency, and that all beacons transmit a homing signal on 121.5 MHz;

.2 France had used test beacons for several years for similar purposes, with a focus on ground-based homing, and also employed their use in the training of SAR mission coordinators (SMCs) and during SAREX, without noticing any issues caused to the system capacity;

.3 a review of Cospas-Sarsat document C/S A.001 (Data Distribution Plan), Table 4-18 to refine the testing specifications and notification requirements might be warranted, and JWG participants who also participated in the Cospas-Sarsat Joint Committee might wish to propose such;

.4 Canada had used up to four test beacons simultaneously in SAREX without noticing impact to the system capacity;

.5 there seemed to be an opportunity for States with test beacons to strengthen cooperation by offering access to those beacons to States without such;

.6 the Cospas-Sarsat Participants were already invited to report the number of test beacons coded with their country code(s) in their annual reports. However, there was no field in the report that was dedicated to the use of these test beacons in particular for training, thus it might be beneficial to add use of test beacons to the reports made by participating States to their annual reports to Cospas-Sarsat; and

.7 while the MEOSAR environment had reduced the potential for overload of the satellite system by increasing the number of satellites in view of a beacon, the possibility of overload was still present. A potential mitigation to this was coordination of the use of test beacons regionally, through the nodal MCCs. However, this question should be addressed by Cospas-Sarsat.

8.1.3 After discussion, the JWG invited participants to submit information relating to 406 MHz direction finding training and the use of test beacons to JWG 33 to inform further discussion.

[7] mail@406.org

Furthermore, the Cospas-Sarsat Secretariat invited Australia and other interested parties to bring the topic to the next Cospas-Sarsat Joint Committee meeting (to be held in Montreal in June 2026).

8.2 SAR experience sharing

8.2.1 The JWG considered the information provided by IMRF (**WP.12**) concerning processes for the sharing of lessons learned from SAR experiences, and inviting views and comments on the document.

8.2.2 The JWG discussed mechanisms by which experiences might be shared. During the discussion, the following views were expressed, that:

.1 the concept had value in preventing recurrence of incidents, nevertheless possible concerns around anonymity would need to be considered;

.2 such a mechanism could be informal or at least non-compulsory;

.3 care must be taken that shared information was based upon factual and verified information, which often took time to develop, for example in incident investigations;

.4 in States with similar mechanisms for other sectors, such as air traffic management or flight operations, experience had shown that an appropriate safety culture was required in order for such experience sharing systems to function effectively; and

.5 it would be beneficial to share lessons and knowledge arising from situations with negative outcomes (such as reports of accidents) and also from situations with positive outcomes, or situations that did not result in an accident with a formal reporting requirement.

8.2.3 The JWG noted that a mechanism for reviewing marine casualties and incidents already existed at IMO, including a GISIS module for reporting and sharing such information. While this work was mainly coordinated by the IMO Sub-Committee on Implementation of IMO Instruments (III), the focus was mainly on ships and not necessarily on lessons learned from search and rescue operations.

8.3 Establishment of the International association of SAR coordinators (IASARC)

8.3.1 The JWG noted the information provided by the United Kingdom (**IP.7**) regarding the establishment of the International Association of SAR Coordinators (IASARC).

9 ANY OTHER BUSINESS

9.1 Global SAR systems review

9.1.1 The JWG considered the information presented by IMRF (**WP.21**) regarding the Global Maritime SAR review project, which aimed to examine the international SAR environment and wider related ecosystem to assess the effectiveness and consistency of SAR systems at local, national, and international levels, and contribute to identifying priority areas for improvement.

9.1.2 During the ensuing discussion, the following views were expressed, that:

.1 the report of the survey referenced in WP.21 would be published publicly on the IMRF website;

.2 items contained in the general SAR overview (paragraph 5.1 refers) might be considered by IMRF; and

.3 next steps would depend upon what was revealed by the findings of the survey.

9.1.3 After discussion, the JWG noted the invitation extended by IMRF to JWG participants to complete the IMRF survey referenced in WP.21.

9.2 IMRF projects

9.2.1 The JWG noted the information presented by IMRF (**IP.2**) on the recent and ongoing activities and projects undertaken by IMRF.

9.3 Use of alternative technologies for distress relay

9.3.1 The JWG noted the information provided by Sweden (**IP.9**) regarding the use of alternative technologies for relay of distress calls in order to expedite the arrival of assistance on-scene.

9.4 Submarines and passenger submersible craft and related SAR issues

9.4.1 The JWG considered the information presented by Chile (**WP.7**) regarding submarines, passenger submersible craft and related SAR issues. The JWG recalled that the subject had been considered at JWG 30 and JWG 31, which had agreed that expanding the existing guidance in the IAMSAR Manual Volume II and III regarding underwater SAR to also include limited guidance of deep-water submersible craft rescue could be explored, including references made to available rescue capabilities among military institutions. The JWG also took into account the instructions on this matter from NCSR 12 (see paragraphs 6.1.1 and 6.1.8 of WP.1).

9.4.2 Regarding the accident of the commercial exploration submersible craft **Titan**, the JWG noted that 'Report of the Marine Board of Investigation into the Implosion of the Submersible TITAN (CG1788361) in the North Atlantic Ocean near the wreck site of the RMS Titanic resulting in the loss of five lives on June 18, 2023', a document that provides a series of considerations on SAR matters, had been published by the United States Coast Guard in August 2025.

9.4.3 To facilitate the discussions, the JWG also noted the information presented by Canada (**IP.6**) regarding training on submarine search and rescue, which underscored the complexity of submarine SAR operations.

9.4.4 During the ensuing discussion, the following views were expressed, that:

.1 text could be more closely aligned to that already contained in the Submarine SAR Manual (NATO Standard ATP/MTP-57), for example the need to provide prior notification to the RCC of submarine operation, incorporation of the recognized phases, and the need for a submarine SAR plan;

.2 it might be appropriate to include guidance regarding prior notification of dive operations and emergency response plans, in line with

Recommendation 8.1.14 of the Marine Board's Report into the Implosion of the Submersible TITAN (CG1788361) in the North Atlantic Ocean Near the Wreck Site of the RMS TITANIC Resulting in the Loss of Five Lives on June 18, 2023;

.3 conversely, it was not the role of RCCs to monitor operations of submarines, rather they should understand the principles of submarine operation in their area of responsibility;

.4 clarification of the difference between ‘submersible’ and ‘submarine’ was required, otherwise consistent terminology should be employed;

.5 perhaps the phrase ‘commercial or scientific’ could be omitted from references to civilian submarines, in order to keep the proposed material concise, and similarly, it might not be necessary to indicate a difference between civilian and military submarines in every instance; and

.6 submarine-ejected floating EPIRBs might be carried, which transmit 406 MHz/121.5 MHz signals when reaching the surface after being released from the craft.

9.4.5 After discussion, the JWG re-established the ad hoc correspondence group under the coordination of Chile[8] to further refine the proposed amendments with a view to their inclusion in the 2028 edition of the Manual.

9.4.6 In doing so, the JWG invited participants to contribute to the work of the ad hoc correspondence groups and provide comments, views and observations to ensure timely finalization of the work, making also use, if necessary, of the commenting deadlines for submission of documents to allow sufficient time for consideration and resolution of any comments, objections or proposals.

9.5 Timing and venue of JWG 33

9.5.1 The JWG noted the offer from Sweden to host JWG 33 in Malmö provisionally planned to be held from 9 to 13 November 2026.

9.6 List of pending and new action items

9.6.1 The JWG updated the list of pending and new action items for the JWG, as set out in **appendix 2**.

10 PROVISIONAL AGENDA FOR JWG 33

10.1 The JWG recommended the provisional agenda for JWG 33, as set out in **appendix 6**.

[8] Mr. Norman Ahumada, n_ahumada_g@hotmail.com

11 REPORTS TO ICAO AND THE NCSR SUB-COMMITTEE

11.1 Action requested of ICAO

11.1.1 The JWG invited ICAO to note the report in general, and in particular:

.1 note the updated list of pending and new action items for the JWG (paragraph 9.6.1 and **appendix 2**);

.2 note the offer of Sweden to host JWG 33 in Malmö provisionally planned from 9 to 13 November 2026 (paragraph 9.5.1); and

.3 approve the draft provisional agenda for JWG 33 (paragraph 10.1 and **appendix 6**).

11.2 Action requested of the NCSR Sub-Committee

11.2.1 The JWG invited the NCSR Sub-Committee to note the report in general and, in particular:

.1 consider the draft amendments to the IAMSAR Manual concerning:

.1 guidance on psychology of emergency, noting that the development of a separate IMO circular was considered to be not warranted with the production of the guidance in the IAMSAR Manual (paragraph 4.2.5 and **appendices 3, 4 and 5**);

.2 ship security alert system (SSAS) (paragraph 3.3.3 and **appendix 5**);

.3 ship reporting systems for SAR (paragraph 3.4.3 and **appendix 4**); and

.4 search planning and evaluation concepts (paragraph 3.5.3 and 3.5.4 and **appendix 4**);

.2 note the progress made on the guidance on submarines and passenger submersible craft and related SAR issues (section 9.4);

.3 note the consideration on the general overview of SAR issues (section 5.1);

.4 note the consideration on the proposed amendments to IAMSAR Manual, Volume I to include a SAR communications and information management guide and a guide on periodic verification of contacts, and that the JWG agreed that the material was not suitable for inclusion in the IAMSAR Manual (section 5.4);

.5 note the consideration on ways of assisting IMO Member States in completing the information in the Global SAR Plan module of GISIS (paragraph 2.2.5);

.6 note the draft amendments to the IAMSAR Manual concerning autonomous distress tracking of aircraft in flight (paragraph 3.1.2 and **appendix 4**);

.7 note the offer of Sweden to host JWG 33 in Malmö provisionally planned from 9 to 13 November 2026 (paragraph 9.5.1);

.8 note the updated list of pending and new action items for the JWG (paragraph 9.6.1 and **appendix 2**);

.9 approve the draft provisional agenda for JWG 33 (paragraph 10.1 and **appendix 6**); and

.10 provide comments on any other work being undertaken by the JWG, as appropriate.

12 EXPRESSION OF APPRECIATION

12.1 In closing, the Vice-Chair thanked all participants for continuing with positive professional efforts in making the best use of the time available. Once again, members and observers all had key roles in this success, and this was a direct result of serving as SAR experts.

12.2 On behalf of the entire JWG, the Vice-Chair expressed deep appreciation and sincere thanks for the arrangements made by the Australian Maritime Safety Authority for hosting JWG 32. The Chair looked forward to future meetings continuing to be face-to-face with more time to discuss issues and proposals, as well as for SAR experts to interact with each other. The JWG had set the stage for a very productive JWG 33 in 2026.

12.3 On behalf of the entire JWG, the Vice-Chair expressed deep appreciation to both the ICAO and IMO Secretariats.

13 CLOSURE OF THE MEETING

13.1 The Vice-Chair closed the thirty-second meeting of the Joint Working Group and wished all participants all the best for continued good health and good times.

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Appendix 1

LIST OF PARTICIPANTS

M(a) = Aeronautical Member
M(m) = Maritime Member
O = Observer

No.	COUNTRY	NAME	STATUS
1	Argentina	Tomas Maria Ainchil	O
2	Australia	Scott Constable	M(a)
3		Alex Barrell	O
4		Gregory Scott	O
5		Kaylene Dale	O
6		Linda Berryman	O
7		Lyndon Leverington	O
8		Mike Wytcherley	O
9	Brazil	José Nonato Coutinho	O
10		Heiland Serotiuk Lyrio	O
11	Canada	Jay Steele	M(a)
12		Beth Fraser	O
13	Chile	Norman Ahumada	M(m)
14	China	Baokang Liu	O
15		DongLi Yang	O
16		Xinbo Ban	O
17		Zhuoran Li	O
18	Cook Islands (the)	John Robert Hosking	O
19	Estonia	Diana Krotova	O
20		Raina Jeeberg	O
21	Fiji	Iliesa Kelevi Batisaresare	O
22	Finland	Mika Runsten	M(a)
23		Sami Järvenpää	O
24	France	Patrice Ropars	M(a)
25		Arnaud Philippe	O
26		Hortense Latron	O
27	Greece	Georgios Kraounakis	O
28	India	Pankaj Verma	O
29	Ireland	Niall Ferns	O
30	Japan	Nanami Takemoto	O
31		Ryosuke Tateishi	O
32	Kiribati	Kabeia Atanraoi	O
33	Kuwait	Mohammad Leri	O
34		Yaser Haider	O

No.	COUNTRY	NAME	STATUS
35	New Zealand	Neville Blakemore	M(m)
36	Niue (New Zealand)	Juliana Tongahai	O
37	Norway	Bjarte Mong	O
38		Ørjan Delbekk	O
39	Papua New Guinea	Desmond Alexis Kopieng	O
40	Saudi Arabia	Fahad Alharbi	O
41		Mohammed T Alkhaldi	O
42		Nasser Albugami	O
43	Singapore	Kit Tai	M(a) (Vice-Chair)
44		Edmund Lee	O
45	Solomon Islands	Agnes Gaote'e	O
46	South Africa	Gregory Critchley	O
47		Peggy Sebesho	O
48	Sweden	Johan Mårtensson	M(m)
49		Katarina Leijonberg	M(a)
50	Tonga	Uelelima Telefoni	O
51	United Kingdom	Mark Chamberlain	M(a)
52		Philipp Bostock	M(m)
53	United States	Richard Scott	O
54	Vanuatu	Hickson Siba	O

No.	ORGANIZATIONS	NAME	STATUS
55	Cospas-Sarsat	Arnaud Sindou	O
56		Shefali Juneja	O
57	CIRM	Mark Lawson	O
58	IMRF	Roland McKie	O

No.	SECRETARIAT	NAME
59	ICAO	John Welton (ICAO Secretary)
60	IMO	Javier Yasnikouski
61		Osamu Marumoto (IMO Secretary)

Appendix 2

LIST OF PENDING AND NEW ACTION ITEMS FOR THE JWG

THIRTY-SECOND MEETING

Topic	Background	Action	Comments
IAMSAR Specific:			
1. Revision of chapter 4 (Search planning) of Volume II and appendices	Report JWG 26, section 3.2 Report JWG 27, section 3.1.12 Report JWG 28, section 6.1.6 Report JWG 32, section 3.5 and 3.6, WP.14 and 17	New Zealand, supported by others	WP at JWG 33
2. Editorial improvements to all volumes of IAMSAR Manual	Report JWG 27, sections 3.1.4 and 9.2. Report JWG 28, section 3.1.9 WP.10 Report JWG 29, sections 3.1.5 and 3.1.10 Report JWG 30, section 3.5, WP.31 Report JWG 32, section 3.2, WP.20	Correspondence Group coordinated by United Kingdom	WP at JWG 33
3. Sweep width	Report JWG 31, section 3.1.3, WP.2 Report JWG 32, section 3.5	United States	WP at JWG 33
4. 406 MHz homing	Report JWG 31, section 6.1, WP.9 Report JWG 32, section 2.2.6	United States supported by others	WP at JWG 33
5. RPA and craft with no persons on board including gap analysis of Annex 12	Report JWG 28, section 3.3 Report JWG 31, section 4.2, WP.6 Report JWG 32, section 3.7, WP.4	United States	WP as appropriate
6. Radar and AIS SART	Report JWG 32, section 6.2	IMRF supported by others	WP at JWG 33
7. Submarines/submersibles and related SAR issues	Report JWG 30, section 4.2, WP.22 Report JWG 31, section 9.1, WP.14 Report JWG 32, section 9.4, WP.7	Chile supported by others	WP at JWG 33
Other:			
8. Developing ideas on how to assist States in implementing improvements in SAR service quality, capacity and capability	Report JWG 27, section 3.2.3.2.2 Report JWG 28, section 5.1 Report JWG 30, section 5.1, WP.20	Members and Secretariat	Continuous through WP and IP

Topic	Background	Action	Comments
	Report JWG 32, section 2.2, WP.1		
9. Make available delimitation of maritime SRRs and arrangement for EGC broadcast in the Global SAR Plan module of GISIS	Report JWG 27, section 7.3.6 Report JWG 28, section 3.4.3 Report JWG 29, section 2.3.7.8 Report JWG 30, section 3.11, WP.7 Report JWG 31, section 2.2, WP.1 Report JWG 32, section 2.2, WP.1	All IMO Member States (who have not provided)	Continuous
10. SAR service oversight	Report JWG 32, section 5.2	Australia supported by others	WP at JWG 33
11. SAR system cybersecurity	Report JWG 32, section 5.3	All participants	WP at JWG 33
12. SRU search plan ingestion	Report JWG 32, section 6.1	United Kingdom supported by others	WP at JWG 33
13. AIS SAR aircraft symbology	Report JWG 32, section 6.3	All participants	WP at JWG 33
14. 406 DF training	Report JWG 32, section 8.1	All participants	WP at JWG 33
ITEMS CLOSED IN 2025:			
(Listing with original numbers with a "c")			
c1. Update on the implementation of GADSS functions	Report JWG 24, para. 3.49 Report JWG 25, section 7.1 Report JWG 26, paras 3.1.19, 4.1.6 and 5.1.4 Report JWG 27, section 3.1.7 Report JWG 28, section 3.4.1 WP.2 Report JWG 29, section 3.2.10 Report JWG 30, section 3.9, WP.10 Report JWG 31, section 2.3.3, WP.12 Report JWG 32, section 3.1.1, WP.3	ICAO Secretariat	Closed
c3. Psychology of emergency	Report JWG 27, section 4.3.2 Report JWG 28, section 4.3.3 Report JWG 30, section 4.1, WP.21 Report JWG 31, section 4.3, WP.13 Report JWG 32, section 4.2, WP.6	Chile supported by others	Completed
c8. Remotely piloted aircraft systems – Gap analysis	Report JWG 28, section 3.3	United States supported by others	Consolidated into RPAS task

Topic	Background	Action	Comments
			coordinated by United States
c12. Refinement of strategic outlook document and agenda item	Report JWG 30, section 9.5, WP.32 Report JWG 31, section 5.2, WP.8 Report JWG 32, section 5.1, WP.8	Australia supported by others	Closed

Appendix 3

PROPOPSED AMENDMENTS TO IAMSAR MANUAL VOLUME I ARISING FROM JWG 32, INCORPORATING THOSE ALREADY AGREED AT JWG 31

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

~~a)~~	~~Text to be deleted is shown with a line through it.~~	text to be deleted
b)	New text to be inserted is highlighted with grey shading.	new text to be inserted
c)	~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading.	new text to replace existing text

IAMSAR Manual Volume I

. . .

Chapter 2

System Components

. . .

2.3 Rescue coordination centres

2.3.1 The RCC is an operational facility responsible for promoting efficient organization of SAR services and for coordinating the conduct of SAR operations within an SRR. An RCC coordinates, but does not necessarily provide, SAR facilities throughout the internationally recognized SRR described in either the Regional Air Navigation Plans (RANPs) of ICAO or the Global SAR Plan of IMO. Aeronautical SAR responsibility may be met by means of an aeronautical RCC (ARCC). Coastal States with the added responsibility for maritime SAR incidents can meet this with a maritime RCC (MRCC). When practicable, States should consider co-locating or combining their maritime and aeronautical RCCs into a joint RCC (JRCC).

Note: The term RCC will be used within this Manual to apply to either aeronautical or maritime centres; ARCC or MRCC will be used as the context warrants.

Note: A JRCC may be established either by physical co-location or by the integration of communications, information and computer technology between an ARCC and an MRCC to achieve full search and rescue coordination functionality.

2.3.2 RCCs should be named geographically, based on the name of cities or ports, or where there is only one RCC in a State, such an RCC could be named after the State. The type of RCC facility should be identified as ARCC (aeronautical rescue coordination centre), MRCC (maritime rescue coordination centre), or JRCC (joint rescue coordination centre), as appropriate. The format should be type of facility followed by geographical name (city or port or State), e.g. MRCC Buenos Aires or JRCC Australia.

2.3.~~2~~3 SAR managers should ensure that the RCC is familiar with the capabilities of all of the facilities available for SAR in its SRR. Collectively, these facilities are the means by which the RCC conducts its operations. Some of these facilities will be immediately suitable for use; others may have to be enhanced by changing organizational relationships or supplying extra equipment and training. If the facilities available in certain parts of an SRR cannot provide adequate assistance, arrangements should be made to provide additional facilities.

Editorial Note.— Renumber subsequent paragraphs

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2.4 Rescue sub-centres

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2.4.3 An aeronautical RSC (ARSC) can be established for aeronautical SAR incidents, and a maritime RSC (MRSC) for maritime SAR incidents.

Note: The term RSC will be used within this Manual except where it applies only to aeronautical or maritime; then ARSC or MRSC will be used.

2.4.4 RSCs should be named using the same principle as RCCs.

2.5 SAR facilities

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Medical advice and medical assistance

2.5.6 The International Convention on Maritime Search and Rescue provides for parties to the Convention to provide, on request from masters of ships, medical advice and initial medical assistance and, as required, to make arrangements for medical evacuations for patients. An RCC should establish a relationship with a maritime telemedical assistance service (TMAS) to ensure that medical advice can be provided to masters at sea within its SRR 24 h a day. The RCC should have the means to coordinate medical assistance and evacuation in consultation with a TMAS. It is desirable to have a doctor or paramedic who has been briefed by the TMAS on board the evacuation craft. The RCC may establish contractual arrangements with a suitably recognized medical authority to provide this telemedical assistance service. A sample text of a contractual arrangement between an RCC and a TMAS is at appendix N.

2.5.7 The circumstances surrounding the deployment of SAR services often carry a risk of adverse psychological impacts for both SAR personnel and the individuals they rescue. SAR services should be organized to include the means to coordinate psychological support for both SAR personnel and rescued persons, as appropriate.

Editorial Note - *Renumber* existing paragraphs 2.5.7 to 2.5.9.

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Chapter 3

Training, qualification, certification and exercises

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3.2 Training specifics

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What to train

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3.2.11 RCC and RSC SAR training should include at least the following topics. If search planning expertise gained from formal training is not used on a regular basis for operations or exercises, periodic refresher training will normally be needed. General categories include:

Aeronautical drift Aircraft coordinator duties

AFN
AFTN
Autonomous distress tracking
Bailout scenarios and planning
Briefing/questioning SRUs
Case studies
Charts
Coastal SAR planning
Computer applications
Cospas-Sarsat
Datum determination
Datum marker buoys
Dealing with families
Dealing with public and news media
Documentation of incidents
Electronic sweep width
Emergency care
Environmental factors
Evaluation of flare sightings
Fatigue factors
IMO-recognized mobile satellite services (such as Inmarsat, Iridium)
International aspects
Interviewing techniques
Leeway drift
Legal concerns
Look-out skills and limitations
Manoeuvring boards
Mass rescue operations
Medical advice
Medical evacuations
Obtain and evaluate data
On-scene coordinator duties
Parachute drift
Plotting skills
Psychological first aid
Registration databases
Rescue procedures
Resource allocation
Risk assessment
SAR agreements
SAR communications
SAR mission coordination
SAR operations conclusion
SAR phases, stages, and components
SAR resource capabilities
SAR system organization
SAR technology
Search areas
Search patterns
Search planning
Ship reporting systems for SAR
SRU selection
Stress management
Survival equipment
Vessel tracking systems (AIS, LRIT, VMS)
Visual sweep width
Water currents

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Chapter 6

Improving services

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6.9 Other factors

6.9.1 The following is a list of some practical principles and suggestions which will help SAR managers be more effective in improving SAR services. SAR managers should consider these and add to the list from their own experiences.

(a) Seek suggestions from people who will be most affected by your decisions.

(b) Never be satisfied with the status quo, but continually seek ways to improve processes.

(c) Realize that it always costs less to prevent than to solve a problem.

(d) Take time to thoroughly understand basic international SAR principles, procedures and vocabulary.

(e) Authorize the making of operational decisions at the RCC level and provide any general guidance or arrangements needed by the RCC to make those decisions.

Taking care of SAR personnel

6.9.2 SAR operations can be complex situations that subject SAR personnel to a high degree of stress, a condition that, in addition to impacting their professional performance, may affect their mental and physical health.

6.9.3 Stress affecting SAR personnel as a result of participating in SAR operations can have multiple factors of origin, including media and judicial pressure, long working hours, sleep deprivation, interaction with families of victims, rescued persons, and exposure to serious injuries, traumatic scenes and deceased persons. The most effective mitigation is to build resilience through training.

6.9.4 SAR managers should consider adopting timely measures of prevention care and psychological support for SAR personnel. Plans, processes and/or procedures should be developed to adequately manage stressful situations or conditions that have the potential to affect the mental health of SAR personnel, such as additional recovery periods after critical interventions or adapted management of schedules, among others.

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Appendix 4

PROPOPSED AMENDMENTS TO IAMSAR MANUAL VOLUME II ARISING FROM JWG 32, INCORPORATING THOSE ALREADY AGREED AT JWG 31

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

~~a)~~	~~Text to be deleted is shown with a line through it.~~	text to be deleted
b)	New text to be inserted is highlighted with grey shading.	new text to be inserted
c)	~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading.	new text to replace existing text

Chapter 1

The search and rescue system

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1.8 Training and exercises

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Training of RCC and RSC personnel

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1.8.15 RCC and RSC SAR training should also include many other topics. If search planning skills, knowledge and expertise gained from formal training are not used on a regular basis for operations or exercises, then periodic recurrent training must be implemented to ensure reliable and effective delivery of SAR services. Subject matter should include:

Aeronautical drift
AFN
AFTN
Bailout scenarios and planning
Case studies
Charts
Coastal SAR planning
Computer applications
Cospas-Sarsat
Datum determination
Datum marker buoys
Dealing with families
Dealing with public and news media
Documentation of incidents
Electronic sweep width
Emergency care
Environmental factors
Evaluation of flare sightings
Fatigue factors
GMDSS
International aspects
Interviewing techniques
Leeway drift
Legal concerns
Look-out skills and limitations
Manoeuvring boards
Mass rescue operations
Medical advice
Medical evacuations
Obtain and evaluate data
On-scene coordinator duties
Parachute drift
Plotting skills
Psychological first aid
Registration databases
Resource allocation
Risk assessment
SAR agreements
SAR communications
SAR mission coordination
SAR operations conclusion
SAR phases, stages, and components
SAR resource capabilities
SAR system organization
SAR technology
Search areas
Search patterns
Search planning
Ship reporting systems for SAR
SRU selection
Stress management
Survival equipment
Vessel tracking systems (AIS, LRIT, VMS)
Visual sweep width
Water currents
Weather

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Chapter 3

Awareness and initial action

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3.8 General considerations for the SMC

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Taking care of SAR personnel

3.8.18 The coordination and conduct of a SAR operation may be prolonged over an extended period of time, causing effects that may influence the physical and mental capacity of SAR personnel, including the SMC. Each emergency by itself has the potential to create a stressful situation that may affect the mental health of SAR personnel and may be compounded over time with the stress of additional challenging SAR incidents.

3.8.19 It is recommended that SAR services establish preventive plans to safeguard the mental health of SAR personnel, as well as procedures adopted to manage the physical and mental stress to which SAR personnel will be exposed.

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Chapter 6

Rescue planning and operations

6.1 General

6.1.1 When the search object has been located, the SMC (or the OSC or master or pilot in command of the SAR facility as the case may be) must decide on the method of rescue to be followed and the facilities to be used. The following factors should be considered:

- action taken by the sighting craft and the SAR action which can be taken by other craft on scene;
- location and disposition of the survivors;
- condition of survivors and medical considerations (physical and psychological);
- number of persons reported to be on board the distressed craft and the number who have been located;
- environmental conditions, observed and forecasted;
- available SAR facilities and their state of readiness (to reduce delay, the SAR facilities which are likely to be used should be alerted and deployed to a suitable location while the search is in progress);
- effect of weather conditions on SAR operations;
- time of day (remaining daylight) and other factors relating to visibility; and
- any risks to SAR personnel, such as hazardous materials.

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6.6 Medical personnel

6.6.1 In formulating any rescue plan, the SMC should consider establishing a forward medical base to enable triage by competent medical staff. Once the search object has been sighted, the SMC must consider whether to send medical personnel to the scene. Another consideration is the mental trauma that both survivors and rescuers may endure. Plans and procedures should be developed to mitigate the mental health impacts to rescuers and rescued persons and for the management of ~~for~~ post-traumatic stress events. ~~syndrome debriefings.~~

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6.13 Rescue of persons from inside damaged, capsized, or ditched craft

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Life-saving

6.13.15 Survivors can be expected to be in state of a panic, confusion and shock, and in complete darkness. These stressors can cause psychological damage to the victims, so it is essential that the initial communication and interaction of the rescuer with them aims to prevent or contain impacts on the mental health of the rescued. Rapid rescue is necessary due to the lack of food, water, and fresh air in a capsized craft.

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6.17 Care of survivors

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6.17.5 SAR personnel must ensure that, after rescue, survivors are not left alone, and should continue to support survivors' ongoing needs, particularly if injured or showing signs of hypothermia or of physical or mental exhaustion.

6.17.6 The care of survivors should also consider their mental condition. An emergency usually generates a stressful environment for the survivor. In this sense, the initial interaction that rescuers have with the survivors may be beneficial in containing mental health impacts.

6.17.7 SAR services should have procedures in place to provide psychological assistance to those survivors who require it. Such procedures or programs have been established by States and organizations with various names, including psychological first aid.

~~**6.17.6**~~ **6.17.8** When selecting the method of transport of survivors to medical facilities, the following factors should be considered:

- condition of survivors;
- capability of the rescue facility to reach the survivors in the shortest possible time;
- medical training, qualifications, and operational capabilities of the personnel;
- rescue facilities' capabilities to transport survivors without aggravating injuries or producing new complications;

- difficulties that may be encountered by land parties (e.g. provision of shelter, food, and water; weather conditions, etc.);
- the possible availability of doctors among the survivors, aboard nearby ships, etc.; and
- methods of maintaining communication with the SMC.

Editorial Note - *Renumber* existing paragraphs 6.17.7 to 6.17.9.

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6.18 Debriefing of survivors

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6.18.3 The debriefing helps to ensure that all survivors are rescued, to attend to the physical welfare of each survivor, and to obtain information which may assist and improve SAR services. Proper debriefing techniques include:

- due care to avoid worsening a survivor's condition by excessive debriefing;
- careful assessment of the survivor's statements if the survivor is frightened or excited;
- use of a calm voice in questioning;
- avoidance of suggesting the answers when obtaining facts; and
- explaining that the information requested is important for the success of the SAR operation, and possibly for future SAR operations.

6.18.4 SAR personnel should consider the mental condition of survivors when debriefing. Survivors may be experiencing stress from hazardous conditions they experienced during the emergency, or they may be susceptible to developing stress, so any inappropriate personal interaction may aggravate the mental health status of the victims.

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6.19.7 SAR operations are conducted only for assisting persons who may be living. However, it is wise to consider the capabilities of existing Disaster Victim Identification (DVI) methods and procedures in the instance of a mass casualty accident.

The DVI operation is a criminal police and forensic science operation carried out according to national policies and legislation in accordance with standards established by INTERPOL. As it is not legally a part of the SAR operation, it is not coordinated or supervised by the RCCs.

DVI may be of significant assistance to SAR personnel in those instances where unidentified human remains are recovered in the course of a SAR case, particularly in those instances of multiple casualties. This will assist SAR personnel in accounting for the persons who are the subject of the SAR case, and to verify whether or not additional persons remain missing. This will facilitate closing the SAR case as expeditiously as possible.

SAR and DVI authorities should cooperate in dealing with the families of missing persons. DVI systems can usually be accessed through liaison with local or national police agencies. SAR personnel are encouraged to assist DVI authorities if that is possible based on other operational commitments and organization policies.

6.20 Psychological care of SAR personnel.

6.20.1 SAR personnel are likely to face stressful situations that have the potential to affect their mental health. SMC teams in charge of coordinating and conducting SAR operations are regularly exposed to physical, emotional and interpersonal factors that may affect mental health. SRU crew members are exposed to adverse operational conditions and must deal directly with survivors and the factors related to their role as rescue personnel. Rescue personnel may be directly exposed to highly stressful environments in the execution of rescue actions, being also the first instance of interaction with survivors.

Psychological risk management for SAR personnel.

6.20.2 Psychological care for SAR personnel should be considered before, during and after a SAR incident. This could be achieved through the development of a psychological risk management approach. The International Maritime Rescue Federation has guidance on developing such plans. Other organizations and States may offer similar programmes.

6.20.3 Preparation is the key to SAR organizations' commitment to mental health support. The aim is to prepare in advance and have the necessary procedures, infrastructure and training in place for SAR personnel.

Editorial Note - Renumber existing sections 6.20, 6.21 to 6.21 and 6.22, including their paragraph numbers.

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Appendix J
Intercepts

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Time to launch the SRU

7.4 If the distressed aircraft is beyond the SRU's maximum operating distance when the emergency is declared, the time to launch the SRU may be computed using the following formula:

[2] $$T_0 = 60\left(\frac{D}{V_b} - D_{mo}\,\frac{V^2{}_{a1} + 2V_{a1}V_{a2} + V_{a2}V_b}{V_{a1}V_b(V_{a1} + V_{a2})}\right)$$

where:

T_0 = The time to launch in minutes after the emergency was declared,

D = The distance, in nautical miles, of the distressed aircraft from the aerodrome when the emergency was declared,

V_b = The ground speed of the distressed aircraft in knots.

For example, consider a scenario where the distressed aircraft declares an emergency when it is 600 miles from its destination while maintaining a ground speed of 200 knots, and the SRU is the same helicopter used in the above examples. Using these values in formula [2], it will be found that the helicopter should not be launched until about 14 min after the emergency was declared.

$$60\left(\frac{600}{200} - 291.67\,\frac{175^2 + (2 \times 175 + \times 125) + (125 \times 200)}{175 \times 200 \times (175 + 125)}\right) = 14.375$$

Note: If formula [2] produces a negative value for T0, it means the distressed aircraft is already close enough for the SRU to be launched immediately.

Note: If it is feared that the distressed aircraft is likely to experience a ditching, forced landing, or bailout situation as soon as it is within the SRU's maximum operating distance or shortly thereafter, then a direct intercept at the SRU's maximum operating distance should be considered. The risk associated with this tactic is that of substantially increasing the SRU's time to scene if the distressed aircraft stays aloft longer than expected. If a second SRU is available, this risk can be eliminated by having it perform a MTTSI intercept in attrition to the direct intercept performed by the first SRU.

Appendix L
Page L.1
Total available search effort (Z_{ta}) worksheet

Total available search effort (Z_{ta}) worksheet

Case title ____________ Case number ____________ Date ____________

Planner's name ____________ Datum number ____________ Search plan A B C
(circle one)

Datum. ____________ Datum ____________
(left) Latitude Longitude (right) Latitude Longitude

Search object ____________ Date/time____________

Total available effort computations

		1	2	3	4	5
1	Search sub-area designation	___	___	___	___	___
2	Search facility assigned	___	___	___	___	___
3	Search facility speed (*V*)	___	___	___	___	___
4	On-scene endurance	___	___	___	___	___
5	Daylight hours remaining	___	___	___	___	___
6	Search endurance (*T*) (*T* = 85% of lesser of **line 4** or **5** ~~above~~)	___	___	___	___	___
7	Search altitude (metres/feet) *(circle one)*	___	___	___	___	___
8	Uncorrected sweep width	___	___	___	___	___
9	Weather, terrain correction factor (f_w, f_t)	___	___	___	___	___
10	Velocity correction factor (f_v) (aircraft only)	___	___	___	___	___
11	Fatigue correction factor (f_f)	___	___	___	___	___
12	Corrected sweep width (*W*)	___	___	___	___	___
13	Search effort ($Z = V \times T \times W$)	___	___	___	___	___

14 Total available search effort ($Z_{ta} = Z_{a1} + Z_{a2} + Z_{a3} + \ldots$)____________ NM^2

15 Separation ratio (*SR*) (leeway divergence datums only)
(from **Datum worksheet**, **line H**~~.3~~ ~~of the~~ ~~**Datum worksheet**~~) ____________

16 If the separation ratio (SR) on line 15 is greater than four (SR > 4), determine whether the datums should be treated as two separate single-point datums or as the endpoints of the baseline portion of a datum line search. If treating them as two separate single-point datums, divide the total available search effort accordingly and complete two separate Effort Allocation Worksheets, one for each point. If treating them as endpoints of a datum line, complete a single Effort Allocation Worksheet following the datum line instructions.~~go to the Widely diverging datums worksheet. Otherwise, go to the Effort allocation worksheet.~~

Appendix L
Page L.3
Total available search effort (Z_{ta}) worksheet instructions

16 In most cases, the separation ratio (SR) will be less than or equal to four (SR ≤ 4) and the search planner may go directly to the Effort allocation worksheet. However, if the separation ratio (SR) entered on line 15 is greater than four (SR > 4), an initial effort allocation decision must be made between the following two choices:

- The two datums may be treated as separate single point datums, each with its own search area. Two separate search areas with no overlap will be the usual result.
- A line may be drawn between the two datums and treated as the base line portion of a datum line. In this case a single search area centred on the datum line will be the result.

~~The Widely diverging datums worksheet instructions provide guidance to help the search planner decide which alternative to use. The Widely diverging datums worksheet helps the search planner make the necessary preparations for entering the Effort allocation worksheet(s).~~

The following conditions can lead to leeway divergence datums becoming so widely separated in comparison to their total probable errors of position that separate search areas should be considered:

- The leeway divergence angle is large (> 30°).
- The leeway rate is moderate to large (> 1 knot).
- The time adrift is significant (> 12 h).
- The probable errors of the initial and search facility positions are small (< 1 NM).
- The probable errors of the factors affecting drift (winds, currents, leeway) are all small (< 0.3 knot).
- The cumulative relative search effort is small to moderate (< 10).

~~Usually all of these conditions must be met before the separation ratio will become greater than four (SR > 4) and the divergence distance (DD) will be large enough to justify dividing the available search effort into two portions assigned to separate, non-contiguous search areas. Only rarely will enough of these conditions be met to create such a situation.~~

17 If treating the two datums separately, then it is necessary to divide the total available search effort into two portions and plan two single point datum searches. Unless there is some reason to favour one datum over the other, the total available search effort should be divided into two equal portions. One example of a situation where one datum should be favoured over the other is the following: Suppose a drifting search object was located by an aircraft and observed long enough to determine its leeway was to the right of the downwind direction, but then contact was lost before a homing beacon could be deployed or a rescue facility could arrive on scene. In this case, the datum for the next search that was to the right of the downwind direction probably should be assigned most of the total available search effort. Whenever search effort is to be allocated separately to two datums, an Effort allocation worksheet should be completed for each datum, using the instructions for a single point datum.

If treating the two datums as endpoints of a datum line, the divergence distance (DD) is used as the baseline length (Lb), then the line is extended in both directions to form the full datum line, as illustrated in Figure L-4 of the Effort Allocation Worksheet Instructions. When the total available search effort is to be allocated in this fashion, a single Effort allocation worksheet should be completed following the instructions for a datum line.

Appendix L
Page L.5
Widely diverging datums worksheet

~~Widely diverging datums worksheet~~

~~Case title ______ Case number ______ Date ______~~

~~Planner's name ______ Datum number ______ Search plan A B C~~

~~Datum. ______ ______ Datum ______ ______~~
~~(left) Latitude Longitude (right) Latitude Longitude~~

~~Search object ______ Date/time ______~~

~~1 Total available search effort (Z_{ta})~~
~~(from **line 14** of the **Total available search effort worksheet)** ______ NM²~~

~~2 Divergence distance (*DD*)~~
~~(from **line G.3** of the **Datum worksheet**) ______ NM~~

~~3 Total probable error of position (*E*)~~
~~(from **line H.2** of the **Datum worksheet**) NM~~

~~4 Type of datum to use for planning this search~~
~~*(Circle one)*~~

~~a Two separate point datums (Go to **line 5**)~~

~~b A line datum between two point datums (Go to **line 6**)~~

~~5 Two separate point datums~~

~~a Available search effort for the left datum ($Z_{a(left)}$) ______ NM²~~

~~b Available search effort for the right datum ($Z_{a(right)}$) ______ NM²~~

~~c Total available search effort ($Z_{ta} = Z_{a(left)} + Z_{a(right)}$)~~
~~(must equal value on **line 1**) ______ NM²~~

~~d Go to the **Effort allocation worksheets** (one for each datum) and follow the instructions for single point datums.~~

~~6 A line datum between two point datums~~

~~a Length of the datum line [$L = DD + (2 \times E)$] ______ NM~~

~~b Go to the **Effort allocation worksheet** and follow the instructions for a line datum.~~

Appendix L
Page L.6
Widely diverging datums worksheet instructions

~~Widely diverging datums worksheet instructions~~

~~Introduction~~

~~It is possible for objects that have leeway divergence to have two widely separated datums whose associated probability~~

density distributions have little or no overlap. When the distance between the datums is large in comparison to the probable error of each datum position, the search planner must decide whether they should be treated as two separate single point datums or as the end points of the base line portion of a datum line.

Experimental evidence indicates that once an object starts to have a leeway to the left of the downwind direction it tends to remain on that tack indefinitely. The same is true if the object starts to have a leeway to the right of the downwind direction. If the initial and search facility probable position errors are small, the leeway divergence angle is large (> 30°), the probable errors of the winds, currents and leeway are all small (each contributing less than 0.3 knot to the drift velocity error), etc. the divergence distance (*DD*) may become greater than four times the probable error of position (*E*). This is an unlikely situation. However, if it occurs, the search planner should seriously consider applying a portion of the available search effort to each datum rather than applying the total available search effort to a single large area that includes both datums and the area between them. Objects that have large divergence angles will tend toward locations on the line connecting the left and right datums only if they jibe or tack downwind. There has been very little evidence of jibing behaviour in the leeway experiments done to date. This means that when the probable errors are small and the divergence angle is large, there is very little chance of the search object being halfway between the left and right datums. If this is the case, then the area that is near the midpoint of the line connecting the left and right datums will not be a very productive area to search.

If the search planner decides to treat the two datums separately, then it is necessary to divide the total available search effort into two portions and plan two single point datum searches. Unless there is some reason to favour one datum over the other, the total available search effort should be divided into two equal portions. One example of a situation where one datum should be favoured over the other is the following: Suppose a drifting search object was located by an aircraft and observed long enough to determine its leeway was to the right of the downwind direction, but then contact was lost before a homing beacon could be deployed or a rescue facility could arrive on scene. In this case, the datum for the next search that was to the right of the downwind direction probably should be assigned most of the total available search effort. Whenever search effort is to be allocated separately to two datums, an **Effort allocation worksheet** should be completed for each datum, using the instructions for a single point datum.

In situations where the wind has shown large and sudden changes in direction, when the sea is confused, etc. the search planner may decide that the probability of the search object jibing or tacking downwind is larger than usual. The search planner may have other reasons for covering all of the area between the left and right datums. In these cases, the search planner should consider drawing a line between the left and right datums and using it as the base line portion of a datum line. When the total available search effort is to be allocated in this fashion, a single **Effort allocation worksheet** should be completed following the instructions for a datum line.

1	Total available search effort (Z_{ta})	Enter the total available search effort (Z_{ta}) from **line 14** of the **Total** available search effort worksheet.
2	Divergence distance (*DD*)	Enter the divergence distance (*DD*) from line G.3 of the Datum work*sheet*.
3	Total probable error of position (*E*)	Enter the total probable error of position from line H.2 of the Datum worksheet. (Note: The value of *DD* on line 2 should be more than four times the value of *E* on this line ($DD > 4 \times E$). If this is not true, discard this worksheet and go directly to the Effort allocation worksheet.)
4	Type of datum	Decide whether to plan the next search around two separate datums or along a datum line that passes through the left and right datums. Circle “a” or “b” as appropriate. If “a” is circled, go to **line 5**. If “b” is circled, go to **line 6**.
5	Two separate point datums	In this case, the total available search effort is to be divided into two parts. One part will be applied to a search area centred on one of the datums while the other part will be applied to a search area centred on the other datum.

	a. Available search effort left for the left datum ($Z_{a(left)}$)	Enter the amount of search effort that will be applied to the datum. This amount must be between zero and the total available search effort ($0 \le Z_{a(left)} \le Z_{ta}$).
	b. Available search effort for the right datum ($Z_{a(right)}$)	Enter the amount of search effort that will be applied to the right datum. This amount must be between zero and the total available search effort ($0 \le Z_{a(right)} \le Z_{ta}$).
	c. Total available search effort ($Z_{ta} = Z_{a(left)} + Z_{a(right)}$)	Add the search effort available for the left datum (**line 5.a**) to the search effort available for the right datum (**line 5.b**). The result should equal the total available search effort (**line 1**). If this is not true, adjust the efforts for the left and right datums so their sum equals the total available search effort (**line 1**).
6	Go to **Effort allocation Worksheets**	Complete an Effort allocation worksheet for each datum. Enter the search effort available for the left datum ($Z_{a(left)}$) on **line 1** of the **Effort allocation worksheet** for the left datum. On a second **Effort allocation worksheet**, enter the search effort available for the right datum ($Z_{a(right)}$) on **line 1**.
7	A line datum between two point datums	In this case, a single search area is to be centred on the line connecting the left and right datums.
	a. Length of the datum line (L)	Compute the length of the datum line by adding twice the total probable error of position (E) from **line 3** to the divergence distance (DD) from **line 2**. Stated as a formula, $L = DD + (2 \times E)$.
	b. Go to the **Effort allocation worksheet**	Go to the **Effort allocation worksheet**. Enter the total available search effort (Z_{ta}) from **line 1** of this worksheet as the available search effort (Z_a) on **line 1** of the **Effort allocation worksheet**. Enter the length of the datum line (L) from **line 6.a** as the length of the datum line (L) on **line 2.b** of the **Effort allocation worksheet**. Follow the effort allocation instructions for line datums.

Appendix L
Page L.8
Effort allocation worksheet for optimal search of single point, leeway divergence or line datums

Effort allocation worksheet for optimal search of single point, leeway divergence or line datums

Case title ______________________ Case number __________ Date ________

Planner's name ______________________ Datum number ________ Search plan A B C *(circle one)*

Datum. ____________ ____________ Datum ____________ ____________
(left) Latitude Longitude (right) Latitude Longitude

Search object ______________________________ Date/time ____________

Effort allocation computations

1 Available search effort (Z_{ta}, $Z_{a(left)}$, or $Z_{a(right)}$)
(from **line 14** of the **Total available search effort worksheet** ~~or~~ ~~**line 5.a** or **line 5.b** of the **Widely diverging datums worksheet**)~~ ________ NM²

2 Effort factor (f_Z)

a Total probable error of position (E) ________ NM

b Length of datum line (L) ________ NM

c Effort factor (f_Z) ($f_{Zp} = E^2$ or $f_{Zl} = E \times L$) ________ NM²

3 Relative effort ($Z_r = Z_a/f_Z$) ________

4 Cumulative relative effort (Z_{rc} = previous $Z_{rc} + Z_r$) ________

5 Optimal search factor (f_s) Ideal______ Normal ______ (f_s) ______

6 Optimal search radius ($R_o = f_s \times E$) ________ NM

7 Optimal search area (A_o) ________ NM²

a Single point datum ($A_o = 4 \times R^2$)

b Leeway divergence datums [$A_o = (4 \times R^2) + 2 \times R \times DD$]

c Line datum ($A_o = 2 \times R_o \times L$)

8 Optimal coverage factor ($C_o = Z_a/A_o$) ________

		1	2	3	4	5
9	Optimal track spacing ($S_o = W/C_o$)	____	____	____	____	____
10	Nearest assignable track spacing (S) (within limits of search facility navigational capability)	____	____	____	____	____
11	Adjusted search areas ($A = V \times T \times S$)	____	____	____	____	____

12 Total adjusted search area ($A_t = A_1 + A_2 + A_3 + \ldots$) ________ NM²

13 Adjusted search radius (R) ________ NM

a. Single point datum $R = \frac{\sqrt{A_t}}{2}$

b. Leeway divergence datums $R = \frac{\sqrt{DD^2 + (4\ X\ A_t) - DD}}{4}$

c. Line datum $R = \frac{A_t}{2\ x\ L}$

14 Adjusted search area dimensions

a Length Length ______________ NM

i. Single point datum *Length* = 2 × *R*

ii. Leeway divergence datums *Length* = (2 × *R*) + *DD*

iii. Line datum *Length of the Base Line* (L_b)

iv. No extensions *Length* = L_b

v. One extension *Length* = *R* + L_b

vi. Two extensions *Length* = (2 x R) + L_b

b. Width = 2 × *R* Width ______________ NM

15 Plot the adjusted search area on a suitable chart (Check when done) ____________

16 Divide the adjusted search area into search sub-areas according to the values on **line 11** (Check when done) ____________

17 Go to the **Search action plan worksheet**.

Appendix L
Page L.10
Effort allocation worksheet instructions for optimal search of single point, leeway divergence or line datums

Effort allocation computations

1 Available search effort (Za) — Enter the total available search effort (Zta) from line 14 of the Total available search effort worksheet unless the left and right datums are to be treated as separate searches. In that case, two Effort allocation worksheets will be required. Enter the available effort for the left datum (Za(left)) on one worksheet and the available effort for the right datum (Za(right)) on the other worksheet.

2 Effort factor (f_Z) — The effort factor (f_Z) provides a standard method for characterizing the size of the area where the search object is probably located. Although the effort factor has units of *area*, its value is only a fraction of the area where the search object may be located.

(a) Total probable error of position (*E*) — Enter the total probable error of position (*E*) from **line H.2** of the **Datum worksheet.**

(b) Length of datum line (*L*) — **For line datums only:** Measure or compute the length of the base line (L_b) connecting two points, such as the last known position of a vessel or aircraft and the next point at which a report was expected but not received. When appropriate, extend the base line in one or both directions by an amount equal to *E* to form the datum line (*L*).

Examples:

(i) A vessel's intended track lies between two ports, the LKP was the port of departure and the vessel is overdue at its destination. The base line is not extended over land in either direction and $L = L_b$.

(ii) A vessel's intended track lies between its last reported position at sea and its next port of call, where it is overdue. In this situation, the seaward end of the base line is extended by E and $L = L_b + E$.

(iii) Both the last reported position and the next position where the vessel or aircraft was expected to report might be in error. In this situation, both ends of the base line are extended by E and $L = L_b + (2 \times E)$. **Figure L-4** depicts this situation.

~~(iv)~~ The distance between two datums is large in comparison to the probable error of each datum position, a line can be drawn between the left and right datum. The divergence distance (DD) is used as the length of the base line (Lb) and is then extended in both directions to form the datum line, as shown in **figure L-4**.~~length of the datum line was computed on line 6.a of the **Widely diverging datums worksheet**. In this situation, the divergence distance (DD) was used as the length of the base line (Lb) that was then extended in both directions to form the datum line, as shown in **figure L-4**.~~

~~Enter the value of L on **line 2.b** if this effort allocation is for a datum line. Otherwise, leave blank.~~

Appendix L
Page L.19
Effort allocation worksheet for optimal search of a generalized distribution

Effort allocation worksheet for optimal search of a generalized distribution

Case title ______________________ Case number ____________ Date __________

Planner's name ______________________ Datum number ________ Search plan A B C
(circle one)

Datum ____________ ____________ ______ ______________________
Latitude Longitude Time Total probable error of position (E)

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Appendix O

Ship reporting systems for SAR

System name and country (if applicable)	Operating authority	General reporting area description	Voluntary or mandatory participation	Categories of ships entitled to participate	Reporting interval	System purpose/ objective	Where/how to send reports
Australia ~~AUSREP~~ MASTREP	Australian Maritime Safety Authority through JRCC ~~AUSTRALIA~~ Australia	The coverage area is the same as for the Australian SAR ~~area~~region. ~~Precise d~~Details ~~are in ALRS, volume 1, part 2.~~also available in the MASTREP and Australian Mandatory Reporting Guide available here: https://www.amsa.gov.au/sites/default/files/mastrep-guide.pdf	Mandatory and voluntary	~~Mandatory for Australian registered vessels and for foreign vessels on voyages between Australian ports, and voluntary for foreign vessels transiting through the AUSREP area and also for fishing vessels and small craft which comply with certain criteria.~~ Mandatory for all Australian flagged vessels within the MASTREP area, and for foreign vessels on voyages between Australian ports. Voluntary for foreign vessels transiting through the MASTREP area and also for domestic commercial vessels fitted with GMDSS and AIS equipment.	~~When entering and departing the area and at intervals not exceeding 24 hours.~~ Reporting is not necessary provided the vessel's AIS (automatic identification system) is switched on. Sail Plans, Position Reports and Deviation Reports are not required.	To aid SAR operations by~~:~~ ~~– limiting the time between the loss of a vessel and the start of a SAR action in cases where no distress signal is transmitted.~~ ~~– limiting the size of a search area, and~~ ~~– providing up-to-date information of shipping in the vicinity of a SAR incident.~~ ~~AUSREP is a positive reporting system. This means that if a report becomes overdue, then a SAR response will be started and may include worldwide communication checks as well as search action.~~	~~Reports are to be addressed to RCC AUSTRALIA and can be sent free of charge through any Australian Coast Radio Station or via Inmarsat-C via LES Perth and using Special Access Code 43. For further details, refer to the ALRS, volume 1, part 2.~~ Australian Maritime Safety Authority (JRCC Australia) Telephone: (02) 6230 6880 (International +61 2 6230 6880) Inmarsat C: via LES PERTH using Special Access Code 43 Email: rccaus@amsa.gov.au

						providing up-to-date information of shipping in the vicinity of a SAR incident.	Postal Address: GPO Box 2181 Canberra City ACT 2601 Australia, AMSA website: www.amsa.gov.au

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Appendix Q

[**Note:** this detailed index page of the appendix has been removed from 2025 edition but presented only for the purpose of facilitating the consideration of amendments to indicate where the changes are proposed.]

Sample problem

F/V Sample – alpha search

Alpha search scenario

1 On 25 January 20~~00~~28 at 2145Z, the *F/V Sample* broadcast a distress radio call. The captain reported the vessel's engines were inoperable and the vessel was taking on water, but the vessel was not in immediate danger of sinking. However, the captain requested assistance. The vessel's reported DR position at 2145Z was given as 37-10N, 065-45W. This DR position was based on a celestial fix at 250100Z JAN ~~00~~28 in position 38-57N, 068-54W. Communications were lost after this initial call for assistance.

A British Airways flight transiting the area while en route to Bermuda at 261100Z JAN ~~00~~28 failed to sight the *F/V Sample*. Based on enquiries about resource availability, the earliest time at which a search can commence is 261630Z JAN ~~00~~28. A search is to be planned for this commence search time.

Wind information

3 Observed and forecast wind data

Date	Time	°T/kts	Date	Time	°T/kts
26 JAN	0000Z	175/32	27 JAN	0000Z	200/32
	0600Z	190/30		0600Z	195/30
	1200Z	210/35		1200Z	195/30
	1800Z	205/37		1800Z	200/28

Vessel description

4 The *F/V Sample* is a 23 m (75- ~~foo~~t) eastern-rigged side trawler, with a black steel hull and a white superstructure.

Search facilities

5 Two ~~four-engine~~ fixed-wing aircraft search facilities are available with ~~GPS~~GNSS navigation systems.

Aircraft type	Speed	On-scene Endurance	Crew fatigue
C-130 Hercules	180 knots	3.00 hours	Normal
P-3 Orion	200 knots	4.00 hours	Normal

Search conditions

6 On-scene weather for 26 January 20~~00~~28:

~~Meteorological v~~Visibility		5 NM	Ceiling	457 m (1500
f~~ee~~t) Winds	210°T/35 k~~no~~ts	Seas	1 – 1.5 m (3–5 f~~ee~~t)	
Sunrise	1100Z	Sunset	2200Z	

Datum worksheet for computing drift in the marine environment

Case title F/V SAMPLE Case number ~~00~~28-001 Date 26 JAN 20~~00~~28

Planner's name SAR SCHOOL Datum number 1 Search plan (A) B C *(Circle one)*

Search object Medium displacement fishing vessel

A Starting position for this drift interval

1	Type of position	Last known position Estimated incident position Previous datum	LKP (EIP) PD *(Circle one)*		
2	Position Date/time	252145	Z	JAN 20~~00~~28	
3	Latitude, longitude of position	37-10	(N)/S	065-45	(W)/E

B Datum time

1	Commence search date/time	261630	Z	JAN 20~~00~~28	
2	Drift interval (B.1 – A.2)			1875	hours

C Average surface wind (ASW)

(Attach **Average surface wind (ASW) worksheet**)

1	Average surface wind (*ASW*)	194	°T	31.72	kts
2	Probable error of drift velocity due to probable error of average surface wind ($ASWDV_e$)			0.3	kts

D Total water current (TWC)

(Attach **Total water current (TWC) worksheet**)

1	Total water current (*TWC*)	057	°T	1.86	kts
2	Probable total water current error (TWC_e)			0.42	kts

E Leeway (LW)

(Attach **Leeway (LW) worksheet**)

1	Left of downwind	324	°T	1.3	kts
2	Right of downwind	064	°T	1.3	kts
3	Probable leeway error (LW_e)			0.~~3~~25	kts

F Total surface drift

Use a manoeuvring board or calculator to add Total water current and Leeway vectors. (See **figure K-1a**)

		(left of downwind)		(right of downwind)	
1	Drift directions	021	°T	060	kts
2	Drift speeds	2.21	kts	3.15	kts
3	Drift distances (F2 x B2)	41.49	NM	59.14	NM

4 Total probable drift velocity error (DV_e)

$$DV_e = \sqrt{\left(ASWDV_e^{\,2} + TWC_e^{\,2} + LW_e^{\,2}\right)}$$

$$= \sqrt{([C2]^2 + [D2]^2 + [E3]^2)}$$ 0.60 kts

G Datum positions and divergence distance

Using a chart, universal plotting sheet or calculator, determine the datum positions and divergence distance (DD) (See **figure K-1b**)

5	Latitude, longitude (left of downwind)	37-48.7	(N)/S	065-26.3	(W)/E
6	Latitude, longitude (right of downwind)	37-39.6	(N)/S	064-40.5	(W)/E
7	Divergence distance (DD)			37.5	NM

H Total probable error of position (*E*) and separation ratio (*SR*)

(Attach **Total probable error of position (*E*) worksheet**)

8	Total probable error of position squared (E^2)	1,002.7	NM^2
9	Total probable error of position (*E*)	31.67	NM
10	Separation ratio ($SR = DD/E$)	1.18	

(SR = G3/H2)

Go to the **Total available search effort worksheet**.

Average surface wind (ASW) worksheet (Manoeuvering board)

Case title F/V SAMPLE Case number ~~00~~28-001 Date 26 JAN 20~~00~~28

Planner's name SAR SCHOOL Datum number 1 Search plan A B C *(Circle one)*

A Average surface wind

1 Surface wind data

Time of observation	Time interval	Number of hours (A)	Wind direction (B)	Wind speed (C)	Wind contribution (D)
260000Z	2145 – 0300	5.25	175 °T	32 kts	168 NM
260600Z	0300 – 0900	6.00	190 °T	30 kts	180 NM
261200Z	0900 – 1500	6.00	210 °T	35 kts	210 NM
261800Z	1500 – 1630	1.50	205 °T	37 kts	55.5 NM
	–		°T	kts	NM
	–		°T	kts	NM
	–		°T	kts	NM
	–		°T	kts	NM

Total hours 18.75 (D) Vector sum of Conributions 194 °T (E) 594.76 NM (F)

2 Average surface wind (*ASW*) [(*E*)°T (*F*/*D*) kts] 194 °T 31.72 kts

B Probable error

1 Probable error of the average surface wind (ASW_e) 5.0 kts

2 Probable error of drift velocity due to probable error of the Average surface wind ($ASWDV_e$) 0.3 kts

Go to **part C** on the **Datum worksheet**.

Total water current (TWC) worksheet

Case title F/V SAMPLE Case number ~~00~~28-001 Date 26 JAN 20~~00~~28

Planner's name SAR SCHOOL Datum number 1 Search plan A B C *(Circle one)*

A Observed total water current (TWC)

1 Source (datum marker buoy (DMB), debris, oil) ______

2 Observed set/drift ______ *°T* ______ *kts*

3 Probable error of observation (TWC_e) ______ *°T* ______ *kts*

*4 Go to **part D** on the **Datum worksheet**.*

B Computed total water current

1 Tidal current (TC)

a Source (tidal current tables, local knowledge) ______

b Tidal current (TC) set/drift (Attach any tidal current computations) ______ *°T* ______ *kts*

c Probable error of tidal current (TC_e) ______ *kts*

2 Sea current (SC)

a Source (atlas, pilot chart, etc.) NOOSP NA6 1400

b Sea current (SC) set/drift 075 *°T* 0.8 *kts*

c Probable error of sea current (SC_e) 0.3 *kts*

*3 Wind current (WC) (Attach **Wind current worksheet**)*

a Wind current (WC) set/drift 044 *°T* 1.13 *kts*

b Probable error of wind current (WC_e) 0.3 *kts*

4 Other water current (OWC)

a Source (local knowledge, previous incidents, etc.) ______

b Other water current (OWC) set/drift ______ *°T* ______ *kts*

c Probable error of other water current (OWC_e) ______ *kts*

5 Computed Total water current (TWC) set/drift 057 *°T* 1.86 *kts*

6 Computed probable total water current error (TWC_e)

$$TWC_e = \sqrt{\left(TC_e{}^2 + SC_e{}^2 + WC_e{}^2 + OWC_e{}^2\right)}$$ 0.42 *kts*

$$= \sqrt{([B1c]^2 + [B2c]^2 + [B3b]^2 + [B4c]^2)}$$

7 Go to **part D** on the **Datum worksheet**.

Wind current (WC) worksheet

Case title F/V SAMPLE Case number ~~00~~28-001 Date 26 JAN 20~~00~~28

Planner's name SAR SCHOOL Datum number 1 Search plan A B C (Circle one)

Wind current (*WC*)

1	Average surface wind (*ASW*) (From **Datum worksheet, line C.1**)	194	°T	31.72	kts
2	Downwind direction (ASW direction ± 180°)			014	°T
3	Wind current drift (from **figure N-1**)			1.13	kts
4	Divergence of wind current (from figure N-1)		±	+30	°
5	Wind current set (Downwind direction ± divergence of wind current) (add divergence in northern hemisphere, subtract in southern hemisphere)			044	°T
6	Wind current (*WC*) set/drift	044	°T	1.13	kts
7	Probable error of wind current (WC_e)			0.3	kts
8	Add result from line 7 to Total water current (TWC) worksheet, line B3.				

Leeway (LW) worksheet

Case title F/V SAMPLE Case number ~~00~~28-001 Date 26 JAN 20~~00~~28

Planner's name SAR SCHOOL Datum number 1 Search plan A (B) C *(Circle one)*

Search object Medium displacement fishing vessel

1	Average surface wind (*ASW*) (from **Datum worksheet**, **line C.1**)	194	°T	31.72	kts
2	Downwind direction (*ASW* direction ± 180°)			014	°T
3	Leeway speed (from **figure N-2** or **N-3**)			1.~~1~~3	kts
4	Leeway divergence angle (from **figure N-2 or N-3**)			± 50	°
5	Leeway directions				
	a Left of downwind (**line 2** – **line 4**)			324	°T
	b Right of downwind (**line 2** + **line 4**)			064	°T
6	Leeway (*LW*)				
	a Left of downwind	324	°T	1.3	kts
	b Right of downwind	064	°T	1.3	kts
7	Probable leeway error (LW_e) (from **figure N-2** or **N-3**)			0.~~3~~25	kts
8	Go to **Part E** on the **Datum worksheet.**				

Total probable error of position (*E*) worksheet ~~for land and marine environments~~

Case title F/V SAMPLE Case number ~~00~~28-001 Date 26 JAN 20~~00~~28

Planner's name SAR SCHOOL Datum number 1 Search plan (A) B C *(Circle one)*

A Probable distress incident/initial position error (*X*)

(Go to **line 1** to compute probable error of the distress incident position. Go to **line 6** if the starting position for this drift interval is a previous datum.)

1	Navigational fix error (from table **N-1** or **N-2**)	2.0	NM
2	Dead reckoning (DR) error rate (from table **N-3**)	15	%
3	DR distance since last fix	184	NM
4	DR navigational error (**line A.2** × **line A.3**)	27.6	NM
5	Glide distance (if aircraft/parachute descent heading is unknown)		NM
6	Probable initial position error (X) (X = **line A.1** + **line A.4** + **line A.5**) or (X = Total probable error of position from the Datum worksheet, line H.2)	29.6	NM

B Total probable drift error (D_e)

1	Drift interval (from the Datum worksheet, **line B.2**)	18.75	hours
2	Probable drift velocity error (DV_e) (from the Datum worksheet, **line F.4**)	0.6	kts
3	Total probable drift error (D_e) (D_e = **line B.1** × **line B.2**)	11.25	NM

C Probable search facility position error (*Y*)

1	Navigational fix error (from table **N-1** or **N-2**)	0.1	NM
2	Dead reckoning (DR) error rate (from table **N-3**)		%
3	DR distance since last fix		NM
4	DR navigational error (**line C.2** × **line C.3**)		NM
5	Probable search facility position error (Y) (Y = **line C.1** + **line C.4**)	0.1	NM

D Total probable error of position (***E***)

1 Sum of squared errors 1002.7 NM
($E^2 = X^2 + D_e^2 + Y^2$)

($E^2 = [A6]^2 + [B3]^2 + [C5]^2$)

2 Total probable error of position 31.67 NM²

$$\left(E = \sqrt{(E = X^2 + D_e^2 + Y^2)}\right)$$

Total available search effort (Z_{ta}) worksheet

Case title F/V SAMPLE Case number ~~00~~28-001 Date 26 JAN 20~~00~~28

Planner's name SAR SCHOOL Datum number 1 Search plan A (B) C *(Circle one)*

Datum. (left) ________ Latitude ________ Longitude Datum (right) ________ Latitude ________ Longitude

Search object Medium displacement fishing vessel

Total available effort computations

		1	2	3	4	5
1	Search sub-area designation	A-1	A-2			
2	Search facility assigned	C-130	P-~~3~~8			
3	Search facility speed (V)	180	200			
4	On-scene endurance	3.0	4.0			
5	Daylight hours remaining	~~7~~5.5	~~7~~5.5			
6	Search endurance (T) (T = 85% of lesser of **line 4** or **5**)	2.55	3.4			
7	Search altitude (metres/(feet)) *(circle one)*	500	1000			
8	Uncorrected sweep width	5.0	5.1			
9	Weather, terrain correction factor (f_w, f_t)	0.9	0.9			
10	Velocity correction factor (f_v) (aircraft only)	1.0	1.0			
11	Fatigue correction factor (f_f)	1.0	1.0			
12	Corrected sweep width (W)	4.5	4.6			
13	Search effort ($Z = V \times T \times W$)	2,065.5	3,128			

14 Total available search effort ($Z_{ta} = Z_{a1} + Z_{a2} + Z_{a3} + \ldots$) 5,193.5 NM²

15 Separation ratio (SR) (leeway divergence datums only) (from **line H.3** of the **Datum worksheet**) 1.18

16 If the separation ratio (SR) on **line 15** is greater than four ($SR > 4$), determine whether the datums should be treated as two separate single-point datums or as the endpoints of the baseline portion of a datum line search. If treating them as two separate single-point datums, divide the total available search effort accordingly and complete two separate **Effort Allocation Worksheets**, one for each point. If treating them as endpoints of a datum line, complete a single **Effort Allocation Worksheet** following the datum line instructions.

Effort allocation worksheet for optimal search of single point, leeway divergence or line datums

Case title F/V SAMPLE Case number ~~00~~28-001 Date 26 JAN 20~~00~~28

Planner's name SAR SCHOOL Datum number 1 Search plan (A) B C (Circle one)

Datum. (left) ________ Latitude ________ Longitude Datum (right) ________ Latitude ________ Longitude

Search object Medium displacement fishing vessel Date/time 261630Z JAN 20~~00~~28

Effort allocation computations

1	Available search effort (Z_{ta}, $Z_{a(left)}$, or $Z_{a(right)}$) (from **line 14** of the **Total available search effort worksheet**		5,193.5	NM²
2	Effort factor (f_Z)			
	a	Total probable error of position (E)	31.66	NM
	b	Length of datum line (L)		NM
	c	Effort factor (f_Z) ($f_{Zp} = E^2$ or $f_{Zl} = E \times L$)	1002.7	NM²
3	Relative effort ($Z_r = Z_a/f_Z$)		5.18	
4	Cumulative relative effort (Z_{rc} = previous $Z_{rc} + Z_r$)		5.18	
5	Optimal search factor (f_s)	Ideal ____ Normal ____	(f_s) 1.1	
6	Optimal search radius ($R_o = f_s \times E$)		34.83	NM
7	Optimal search area (A_o)		7,464	NM²
	a	Single point datum ($A_o = 4 \times R^2$)		
	b	Leeway divergence datums [$A_o = (4 \times R^2) + 2 \times R \times DD$)]		
	c	Line datum ($A_o = 2 \times R_o \times L$)		
8	Optimal coverage factor ($C_o = Z_a/A_o$)		0.70	

		1	2	3	4	5
9	Optimal track spacing ($S_o = W/C_o$)	6.45	6.45			
10	Nearest assignable track spacing (S) (within limits of search facility navigational capability)	6.5	6.5			
11	Adjusted search areas ($A = V \times T \times S$)	2983.5	4420			

12	Total adjusted search area ($A_t = A_1 + A_2 + A_3 + \ldots$)	7,403.5	NM²
13	Adjusted search radius (R)	34.7	NM

d. Single point datum $R = \frac{\sqrt{A_t}}{2}$

e. Leeway divergence datums $R = \frac{\sqrt{DD^2+(4 X A_t)-DD}}{4}$

Line datum $R = \frac{A_t}{2 x L}$

14 Adjusted search area dimensions

a Length — Length 107 NM

i. Single point datum — *Length* = 2 × *R*

ii. Leeway divergence datums — *Length* = (2 × *R*) + *DD*

iii. Line datum — *Length of the Base Line* (L_b)

iv. No extensions — *Length* = L_b

v. One extension — *Length* = $R + L_b$

vi. Two extensions — *Length* = $(2 x R) + L_b$

b. Width = 2 × *R* — Width 69 NM

15 Plot the adjusted search area on a suitable chart (Check when done) ____________

16 Divide the adjusted search area into search sub-areas according to the values on **line 11** (Check when done) ____________

17 Go to the **Search action plan worksheet**.

Results of a Monte Carlo simulation using the *F/V Sample* data for the alpha search

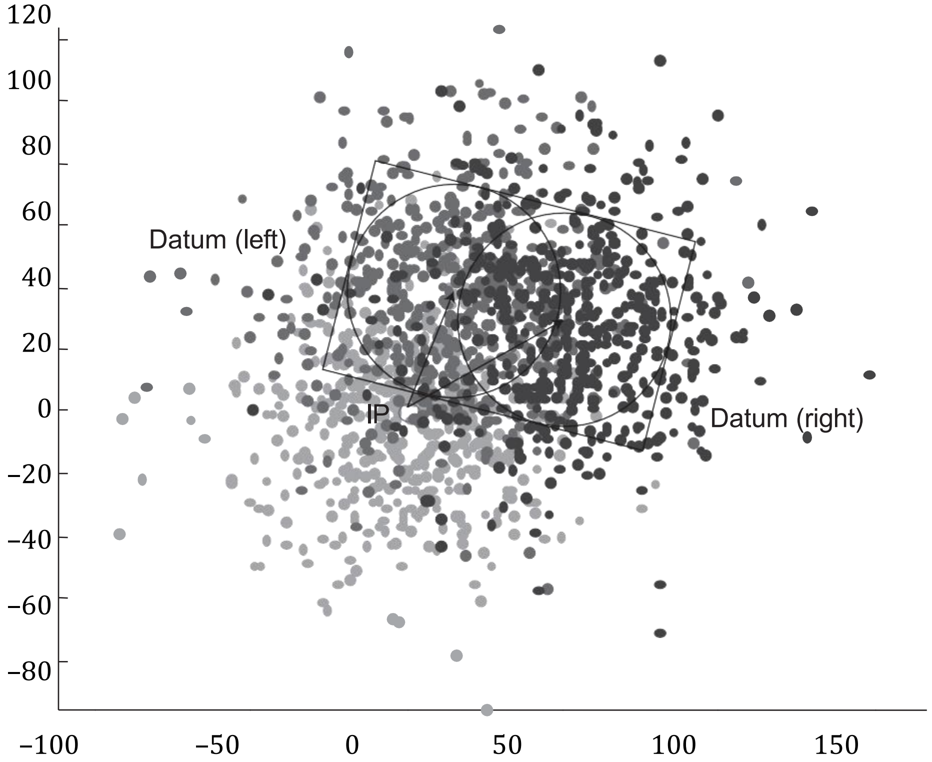

Figure Q-1 – *Monte Carlo simulation of F/V Sample – alpha search*

Table Q-1 – *Search data - Monte Carlo simulation of F/V Sample – alpha search*

Area	POC	Coverage	POD	POS
7,343 NM^2	70.8%	0.70	50.2%	35.6%

Green/light grey dots represent some of the possible initial search object locations. Blue/black and red/dark grey dots (nearly indistinguishable if printed in black-and-white) represent some of the possible search object locations at the commence search time. There are 500 dots of each color. Only the blue and red dots inside the search rectangle were counted and used to estimate the probability of the search object being in the search area at the commence search time.

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Appendix V

Autonomous distress tracking of aircraft in flight.

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19 Appropriate entities will be able to request a free subscription to the LADR throughand the ICAO OPS Control Directory (OPS CTRL), which can be accessed at: www.icao.int/safety/globaltrackingfrom aircrafttracking@icao.int. Both systems will use the ICAO Data Network for Aviation (DNA) for authentication and single sign-in.

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21 Subscribing to the LADR is voluntary for all entities other than aAircraft operators, who will need whose aircraft are equipped with autonomous distress tracking (ADT) devices are required to subscribe to the LADR in order to "ensure that the location of an aircraft in distress repository (LADR) is automatically updated with autonomous distress tracking (ADT) data from an aircraft in a distress condition" (Doc 8168, Procedures for Air Navigation Services – Aircraft Operations, volume III – Aircraft Operating Procedures, section 10, chapter 2). Appropriate ATS units are required by Annex 11 — *Air Traffic Services* to subscribe to OPS CTRL. However, RCCs are strongly encouragedrequired by Annex 12 — *Search and Rescue* to subscribe to LADR and OPS CTRL in order to have access to up-to-date and accurate position information of aircraft potentially in distress.

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24 As per the responsibilities outlined in ICAO aAnnex 6 – Operation of Aircraft, part I – International Commercial Air Transport – Aeroplanes, appendix 9, the aircraft operator will inform the appropriate area control centre in a timely manner if there is reason to believe that the aircraft is in distress. This could be due to a confirmation of the validity of the activation, or inability to contact the crew to validate the nature of the activation. Contact details for area control centres can be obtained from the ICAO OPS Control Directory (OPS CTRL), which can be accessed at: www.icao.int/safety/globaltrackinghttps://ladr.eurocontrol.int/ops/frontend. Access to data is governed by user profiles, in line with those for the LADR. The aircraft operator will also inform the appropriate area control centre if it is confirmed that the aircraft is not in distress.

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Appendix 5

PROPOPSED AMENDMENTS TO IAMSAR MANUAL VOLUME III ARISING FROM JWG 32, INCORPORATING THOSE ALREADY AGREED AT JWG 31

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

~~a)~~	~~Text to be deleted is shown with a line through it.~~	text to be deleted
b)	New text to be inserted is highlighted with grey shading.	new text to be inserted
c)	~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading.	new text to replace existing text

Contents

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Chapter 3

Medical assistance

Medical emergencies

- Conduct assessment of victim for primary medical treatment, including an assessment of their mental health and emotional state, where applicable.
- Attend to treatment as best as possible with on-board facilities and medications.
- See discussion on MEDICO and MEDEVAC below.
- If medical evacuation is required, alert proper authorities.
- Prepare patient for evacuation.
- Gather appropriate paperwork and attach to patient.

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Chapter 4

Vessel emergencies at sea

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Unlawful Acts

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Pirates board unnoticed

- A vessel should comply with any order by pirates or armed robbers not to make any form of transmission informing shore authorities of the attack. Pirates may carry equipment capable of detecting terrestrial radio signals.
  - ☐ a recommended method of action in this scenario is to activate SSAS operating through satellite so as not to be detected by the pirates
  - ☐ the alarm signal should be made through Inmarsat by using the Inmarsat-C “piracy/armed robbery attack” message along with the vessel’s current position.
- This message should be activated by means of concealed push buttons located in at least ~~three~~ two separate locations on the vessel.

- ☐ ~~wheelhouse~~ navigation bridge
- ☐ ~~master's cabin~~ one other location (e.g., master's cabin)
- ~~☐ engine-room.~~

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Chapter 8

On-scene communications

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Survival and emergency radio equipment

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- SOLAS ships should have a SART to interact with 9 GHz vessel or aircraft radars for locating survival craft (SART responses show up as a distinctive line of about 20 equally-spaced blips on compatible radar displays, providing a bearing and range to the SART)

  - Ship and aircraft radar signal processing and other functions may have to be disabled or adjusted to detect a radar SART. Doing so may degrade the radar's performance in detecting other targets. Consult the radar operating manual or radar's manufacturer.

- AIS-SART is an alternative to survival craft radar transponders. AIS-SART is a transmitter which sends a signal to the AIS. It is programmed with a unique identity code and receives its position via an internal GNSS. The AIS-SART is detected on both class A and B and AIS receivers. The AIS target will be shown on ECDIS or chart plotters as a red circle with a cross inside.

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Chapter 20

Survivors

Immediate care of survivors

- Once on board, medical care and welfare of the survivors should be attended to. Additional assistance should be sought from the SAR authorities as required.
- Medical advice should be sought from the Telemedical Maritime Advice Service, via the RCC. See chapter 3.
- After a rescue, survivors may require hospital treatment.
- They must be delivered to a place of safety as quickly as possible.
- The SMC should be advised if ambulances are needed.
- SAR personnel should be alert and ensure that after rescue, survivors are not to be left alone, particularly if injured or showing signs of physical or mental exhaustion.
- When survivors are delivered to a hospital, the person in charge of the delivering facility should provide information on all initial medical treatment given to the survivors.

Psychological First Aid

- If during rescue operations, SRU personnel find that the victims are experiencing mental health issues, the SRU should contact the SMC and seek medical assistance for that person.

- Ships and SAR units should have relevant medical and psychological assistance manuals and checklists available to provide basic initial assistance and assessment.

- SAR personnel should consider providing psychological first aid to survivors, where SAR personnel are trained in such, or ensure psychological first aid is provided to survivors by suitably trained persons as soon as possible after the event.

Recording information on survivors

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Debriefing of survivors

- Survivors should be questioned about the distressed craft as soon as possible. Their input may be able to further assist in the SAR operation, future SAR operations, or the prevention of incidents in the future. The information should be relayed to the SMC.

- Personnel conducting such a debrief should consider the mental health of survivors. Survivors may be experiencing stress from the conditions they experienced during the emergency, or they may be susceptible to developing stress, so any inappropriate personal interaction may aggravate the mental health status of the victims.

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Appendix 6

PROVISIONAL AGENDA FOR THE THIRTY-THIRD MEETING OF THE ICAO/IMO JOINT WORKING GROUP ON HARMONIZATION OF AERONAUTICAL AND MARITIME SEARCH AND RESCUE

1 Adoption of the agenda

2 Decisions of ICAO and IMO bodies related to the Joint Working Group work, for instance:

- *Briefing on the outcome of ICAO activities; and*
- *Briefing on the outcome of IMO activities.*

3 Conventions, plans, manuals and other documents affecting SAR, for instance:

- *amendments to the IAMSAR Manual, including changes to facilitate use by training institutions;*
- *Status of the Maritime SAR Convention and Annex 12 to the Convention on International Civil Aviation;*
- *Alignment of the IMO Area SAR Plans, GMDSS Master Plan and ICAO Regional Air Navigation Plans; and*
- *Progress report on work by the ANC and provisions pertaining to airborne carriage of crash alert and signalling equipment.*

4 SAR operational principles, procedures and techniques, for instance:

- *Development of operational guidelines for safe and effective search and rescue operations, taking account of experience gained from past SAR events;*
- *Mass rescue operations, taking account of experiences gained;*
- *Medical assistance in the context of SAR services;*
- *Effects of measures to enhance maritime and aeronautical security on SAR services, including the implementation of the long-range identification and tracking (LRIT) system;*
- *Development of new and revised procedural strategies for the practical provision of SAR services; and*
- *Development of a structured process to review SAR alerting procedures between ATC services and SAR authorities.*

5 SAR system administration, organization and implementation methods, for instance:

- *Regional SAR development, including SAR committees and task forces;*
- *Development of guidance on regulatory provisions and other guidelines for State and subregional SAR organizations;*
- *Quality assurance, systems improvement, needs assessment, risk management, safety management and resource allocation;*
- *Evaluating the effect of various technical cooperation projects in conjunction with relevant governments, organizations and agencies with a view to assessing their impact on implementing and maintenance of effective SAR services; and*
- *General overview of the global SAR operating environment, including State and industry SAR system initiatives, identification of new and emerging issues, global SAR system implementation status and SAR system data and trends.*

6 RCC/RSC and SAR equipment and facility designations and standards, for instance:

- *Establishment of RCCs and in particular JRCCs;*
- *Status of AIS, ADS-B and shore/land-based facilities and systems in aeronautical and maritime SAR; and*
- *SAR equipment, including information technology.*

7 SAR communications, for instance:

- *Status, elements and procedures of maritime communication systems for distress and SAR, including the GMDSS;*
- *Status, elements and procedures of aeronautical communications systems for distress and SAR, including GADSS;*
- *Status of the Cospas-Sarsat system, including MEOSAR and development of second generation beacons; and*
- *Monitor trends in SAR communications and provide advice on emerging technologies.*

8 SAR personnel staffing and training, for instance:

- *Development of RCC Staff qualifications and standards; and*
- *Development of joint SAR training courses based on the IAMSAR Manual.*

9 Any other business

10 Provisional agenda for JWG 34

11 Reports to ICAO and the NCSR Sub-Committee

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