

INTERNATIONAL CIVIL AVIATION ORGANIZATION



ASIA/PACIFIC SEARCH AND RESCUE (SAR) PLAN

Version 3.0 August 2019

This Plan was developed by the Asia/Pacific Search and Rescue Task Force (APSAR/TF) and the Asia/Pacific Search and Rescue Work Group (APSAR/WG)

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SCOPE OF THE PLAN

Plan Structure

1.1 The Asia/Pacific Search and Rescue (SAR) Plan (hereinafter referred to as the ‘Plan’) references different levels. At the higher level are global requirements established by the ICAO Annex 12 to the ICAO Convention on International Civil Aviation (ICAO Doc 7300). Global guidance material is provided by the International Maritime Organization (IMO) and ICAO’s joint publication, the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual. Beneath this is regional planning guidance primarily provided by this Plan and other regional guidance material, in order to enable States to define the goals and means of meeting objectives for State planning towards improving State SAR System capability, such as Regional Air Navigation Plan (RANP, ICAO Doc 9673) objectives.

1.2 The global air navigation perspective is guided mainly by the *Global Air Navigation Plan* (GANP, Doc 9750), the *Global ATM Operational Concept* (Doc 9854) and the *Global Aviation Safety Plan* (GASP).

1.3 The scope of the Plan is the identification of:

- the current status of SAR preparedness of Asia/Pacific Region States and State SAR arrangements; and
- recommendations for SAR planning and preparedness enhancements, in terms of compliance with Annex 12 of the ICAO Convention, IAMSAR Manual guidance, and accepted best international practice.

1.4 References in the Plan to ‘States’ are intended to include Special Administrative Regions and territories.

Plan Review

1.5 As an iterative process, the Plan requires regular updating to keep current with changes in ICAO Annexes and guidance material, outcomes from the ICAO-IMO JWG-SAR, the IAMSAR manual, regional aviation activity, developments in the Air Traffic Management (ATM) system, new technology, political considerations, human performance and lessons learned from actual SAR responses. Plan updates should also focus on the SAR system being an important component of an integrated regional and global air navigation system. It is intended that APANPIRG and its contributory bodies conduct a complete review every three years from 2019 (or a shorter period determined by Asia/Pacific Air Navigation Planning and Implementation Regional Group - APANPIRG) of the Plan to align with the review cycle of the GANP and the IAMSAR Manual. The review should be guided by a consultative process involving States and relevant International Organisations and technical bodies.

OBJECTIVES

Introduction

2.1 Asia/Pacific States who are signatories to the Chicago Convention accept the responsibility for the provision of SAR services per the requirements of Annex 12 – *Search and Rescue*. Increases in both aviation and maritime traffic throughout the Asia/Pacific region places additional importance on the ability for States to be adequately prepared for potentially increased demand for aeronautical and maritime SAR services.

2.2 The world's citizens, who frequently fly over or sail through the Asia/Pacific, expect a timely and adequate SAR response to be provided should it be required. States in the region need to be adequately prepared for the provision of efficient and effective SAR services. To assist in achieving this, it is essential for States to cooperate, collaborate and in some cases assist with resources to neighbouring and sub-regional RCCs.

2.3 ICAO Regional Office maintains a record, as reported to ICAO by the States themselves, of the status of individual State SAR compliance against Annex 12 requirements. There are significant variations in the level of State SAR capability across the region with significant gaps requiring urgent action, especially in oceanic areas. A number of States have not reported their status at all to ICAO. The ICAO Universal Safety Oversight Audit Programme – Continuous Monitoring Approach (USOAP-CMA) also provides a useful tool to States to self-assess their individual SAR system status. Since the establishment of this Plan, there had already been commendable improvements to the SAR systems of some States which have contributed to building better regional SAR capability. However, there was still considerable work required to address capability gaps.

2.4 There is a high risk of negative consequences to a State which does not provide an adequate SAR response to an aircraft or vessel in distress. The primary concern is the higher probability for loss of lives which may have been saved. The ability for news to spread rapidly in today's technologically connected world also provides the opportunity for a poor or ineffective SAR response to quickly reach a global audience resulting in damage to that State's reputation internationally and potential economic loss to sensitive State industries such as tourism and transport. However, the benefits of an effective and reliable SAR service to States offers many advantages. Besides reduction of loss of life and human suffering, other advantages include the following aspects.

- a) Safer and more secure environment for aviation and maritime related industries, commerce, recreation and travel. Increased safety may promote use and enjoyment of aviation and maritime environments, tourism and economic development. This is especially true when the SAR system utilised programmes aimed at preventing or reducing the effects of mishaps, sometimes referred to as 'Preventative SAR'.
- b) Availability of SAR resources often provides the initial response and relief capabilities critical to saving lives in the early stages of natural and man-made disasters. SAR services offer an integral part of local, national and regional emergency management systems.
- c) Well performed SAR operations can provide positive publicity about situations which may otherwise be viewed negatively. This can lead to improved public confidence in that State's reputation and commitment to providing a safe environment, leading to increased confidence to conduct activities beneficial to that State's economy.
- d) As SAR is a relatively non-controversial and humanitarian mission, it provides an excellent opportunity to enhance cooperation and communication in general between States and organisations, not only for SAR. It can also foster better working relationships between States and organisations at the local, national and international levels, including civil/military cooperation.

2.5 In 2014 Malaysia Airlines flight MH370, a Boeing 777 with 239 persons on board, disappeared when flying from Kuala Lumpur, Malaysia to Beijing, China, and Air Asia QZ8501 was lost on a flight from Surabaya to Singapore. The MH370 event resulted in probably the largest and most expensive search response for a missing aircraft in human history. Together with Air France flight AF447, which crashed into the Atlantic Ocean in 2009, these tragedies have highlighted vulnerabilities in the current air navigation system, including the SAR system, which have hampered timely identification and localisation of aircraft in distress, hindering effective response efforts. ICAO is addressing these vulnerabilities through implementation of functions of the Global Aeronautical Distress and Safety System (GADSS) concept of operations; however, this new system is also dependent on improvements in global SAR capability, especially for remote and oceanic SAR response.

2.6 The Plan is designed to address both civil and military SAR authorities and has been developed in consultation with Asia/Pacific States, SAR administrations and relevant International Organisations. States should consult with stakeholders nationally, regionally and internationally as appropriate and determine actions in order to commit to achieving the objectives of this Plan in order to meet at least the minimum SAR service requirements in accordance with ICAO Annex 12. It is noted that where a State is unable to meet minimum SAR Standards and Recommended Practices (SARPs) of ICAO Annex 12, Article 38 to the ICAO Convention requires notification to ICAO of the differences between its own practice and that established by the international standards.

2.7 It is a common practice for the military to conduct or have a major role in SAR operations to fulfil or assist in fulfilling the State's obligation to provide SAR services. From the perspective of providing SAR services, civil-military coordination takes on many forms. This includes coordination during an actual SAR response, national coordination with other agencies to determine the military role, part of an international agreement or set of procedures with a neighbouring State to assist in SAR response, or other types of coordination. ICAO Document 10088 – Civil/Military Cooperation is focused on airspace management and includes SAR matters relevant to civil-military coordination in airspace management.

2.8 The 2019 edition of the IAMSAR Manual, Volume II, Chapter 7 Multiple Aircraft Operations has guidance on establishing areas of SAR action to assist with the safe coordination and management of aircraft operations during SAR operations. SAR authorities should have procedures in place to rapidly notify airspace users of SAR operations and the establishment of any temporary airspace operation such as danger areas or restricted areas through appropriate State authorities. The combination of guidance in the IAMSAR Manual and ICAO Document 10088 should enable a State to have an appropriate plan in place for civil-military coordination and cooperation in readiness for efficient and effective SAR response.

2.9 States should aim to meet their obligations progressively in a strategically structured and planned manner with improvement goals set for short term, medium term and long term implementation. It may be more productive to make gains in small steps commencing with measures that are more easily achievable in the short term and have a minimal cost, progressing to measures which will take longer to implement over the medium to long term. Short term measures that may be implemented relatively easily include the establishment of a national SAR Committee and ensuring SAR Agreements are in place with neighbouring States allowing for seamless cross-border transit of search assets engaged in SAR activity. A SAR agreement can be in the form of 'Letter of Agreement' (LOA) or a Memorandum of Understanding or other acceptable term indicating a lower form of arrangement for operational matters between SAR service providers (such as RCCs and/or RSCs) or a more formal agreement for arrangements between governments concerned.

2.10 All States are encouraged to use the guidance provided within this Plan as a way forward, thus ensuring a timely, well-coordinated response to any SAR incident within their area of responsibility, or during cooperative responses involving more than one Search and Rescue Region (SRR) including overlapping aeronautical and maritime SRRs which may be the responsibility of different RCCs.

Plan Objective

2.11 The objective of this SAR Plan is to provide a framework to assist Asia/Pacific States to meet their SAR needs and obligations accepted under the Convention on International Civil Aviation and for the harmonised and interoperable delivery of both aeronautical and maritime SAR services within the region, and across other ICAO regional boundaries, where practicable.

2.12 The Plan is to be consistent with the SARPs of ICAO Annex 12 - Search and Rescue, and aligned where appropriate with the SAR technical and operational standards and guidance of the IMO.

2.13 The Plan recognizes that ICAO serves as the forum for the implementation of practical and achievable measures to improve SAR services for international civil aviation. The Plan also recognizes that the IMO provides a similar forum for SAR services to maritime shipping.

2.14 Both ICAO and IMO share the same goal of ensuring that SAR services are available globally wherever people sail or fly. The SAR services that ICAO and IMO promote are complementary and offer tangible opportunities to derive mutually beneficial efficiencies for both the aviation and maritime transportation SAR systems globally, regionally and nationally. The objective of this Plan includes encouraging States to take advantage of such efficiencies. States should, where practicable, align their SAR systems with the guidance provided by the IAMSAR Manual, which also provides the benefit for standardised SAR coordination between RCCs and across SRR lines of delineation.

2.15 State SAR plans describe how SAR services will be provided, organized and supported in order for States to meet their obligations under the relevant Conventions. Search and Rescue Coordinators (SC) and SAR managers oversee and implement these plans. National SAR plans should be signed by all Government agencies which can provide or support SAR services. These agencies should all be represented on the State's Search and Rescue Coordinating Committee (SCC), which oversees these plans.

Note: The SC should not be confused with the operational nature of the SAR Mission Coordinator (SMC). The primary purpose of the national SC is to enable a whole-of-government approach to make efficient and effective use of a State's capabilities for SAR.

Plan Development

2.16 The Plan was developed as part of a suite of Asia/Pacific air navigation plans, including the *Asia/Pacific Seamless ATM Plan*, the *Asia/Pacific Plan for Collaborative Aeronautical Information Management (AIM)*, the *Asia/Pacific Framework for Collaborative Air Traffic Flow Management (ATFM)*, and the *Regional ATM Contingency Plan*, so the Plan should not be considered in isolation.

2.17 The Plan is expected to provide guidelines and recommendations for Asia/Pacific States to consider for the enhancement and improvement of national, sub-regional and regional SAR capability including:

- a) compliance with Annex 12 SARPs;
- b) identification and addressing of deficiencies in SAR capability;
- c) continuous and coherent development of SAR capability;
- d) harmonisation of aeronautical and maritime SAR services;
- e) civil/military cooperation and coordination (including SAR response, information sharing and use of airspace);
- f) remote oceanic SAR response capability (including provision for Mass Rescue Operations (MRO));

- g) establishment and review of arrangements between neighbouring States to expeditiously facilitate SAR coordination, operations and cooperation across regional boundaries including sharing SAR resources and contingency procedures;
- h) facilitation of the implementation of SAR systems and services including the establishment of JRCCs where suitable and practicable;
- i) supporting the sharing of SAR information, data and expertise;
- j) integration with ATM systems and future ATS developments, where appropriate;
- k) monitoring of outcomes from APANPIRG Sub-Groups, other ICAO Region SAR groups, ICAO/IMO Joint Working Group on Harmonisation of Aeronautical and Maritime SAR (JWG) and related forums for issues that may affect the Plan;
- l) facilitation of a continuous reporting mechanism of State SAR capability, Annex 12 compliance and SAR performance data to the APAC Regional Office through the APANPIRG Air Traffic Management Sub-Group (ATM/SG);
- m) implementation of a SAR System Improvement and Assessment measures, including Safety Management System, Quality Assurance programme and risk assessment, and programs to reduce the number of SAR incidents;
- n) coordinating the introduction of new technology affecting the regional SAR system;
- o) sharing future research and development concepts;
- p) seeking efficiencies, through the coordination and facilitation of concurrent regional SAR meetings, seminars, workshops and exercises, including joint ICAO and IMO, and sub-regional forums where practicable; and
- q) conducting efficient SAR Exercises (SAREXs) that identify improvements and latent problems.

2.18 The Plan elements should be periodically reviewed by APANPIRG to ensure that they remain relevant to the SAR system, particularly for new technology developments and alignment with other relevant global and regional SAR plans and the Global Air Navigation Plan.

EXECUTIVE SUMMARY

3.1 The Asia/Pacific Region had the largest share of Passenger Kilometres Performed (PKP), accounting for more than one third of the global total at 34.5% (Europe and North America were the two other key regions, with shares of 26.7% and 22.4% respectively). As the world's major manufacturing and distribution hub, the Asia/Pacific Region also accounted for the largest share of global air freight traffic in 2018, at 35.5%.

3.2 For the maritime industry, the United Nations Conference on Trade and Development (UNCTAD) Review of Maritime Transport 2017 reported that Asia remained the main global cargo loading and unloading area in 2016 with the largest world shipping tonnage share of 40% Loaded and 61% Unloaded. Growth in the cruise ship industry together with the many other forms of maritime transport such as fishing vessels and passengers ferries creates added potential demand for regional SAR services. Whilst IMO assists the Parties to the Maritime SAR Convention, particularly their implementation related to the provision of maritime SAR services, the demand for aeronautical SAR services which frequently support responses to maritime SAR incidents is also likely to rise.

3.3 Asia/Pacific States who are signatories to the Chicago Convention accept the responsibility for the provision of SAR services per the requirements of Annex 12 - *Search and Rescue*. Increases in both aviation and maritime traffic throughout the Asia/Pacific region places additional importance on the ability for States to be adequately prepared for potentially increased demand for aeronautical and maritime SAR services.

3.4 Considering that many of the Asia/Pacific States have the challenging responsibility for providing a SAR service over vast and remote areas, including three of the world's five oceans, the importance for States with oceanic SAR responsibility to cooperate, collaborate and share resources with their neighbouring and regional/sub-regional RCCs is essential.

3.5 High-level support might be necessary from regional bodies that can effectively support the Plan's implementation, such as the:

- Association of Southeast Asian Nations (ASEAN) and ASEAN Regional Forum (ARF);
- Asia Pacific Economic Cooperation (APEC);
- South Asian Association for Regional Cooperation (SAARC);
- Secretariat of the Pacific Community (SPC); and
- Indian Ocean Rim Association (IORA).

SAR System Funding

3.6 The level of funding provided for effective SAR systems is a matter of concern for all senior decision-makers. An effective SAR system helps prevent lives being lost that may have been saved which provides a persuasive argument for proper funding. The resources should be sufficient to develop and/or maintain the required SAR service per their obligations as signatories to the relevant aeronautical and maritime SAR conventions. This may require the development of business cases to governments outlining where additional funding is required.

3.7 Such business cases should include consideration of amendments to existing State SAR arrangements which may provide more efficient delivery of the SAR service by better utilisation of existing resources (for example by establishing Joint RCCs (JRCCs), or additional funding sources where required (for example charging a levy to aircraft operators for providing the SAR service or seeking company sponsorship for SRUs). The economic value of a life saved when compared against the economic value of a life lost can also be a significant persuasive factor in any business case.

Joint Rescue Coordination Centres (JRCCs)

3.8 Where practicable, States are encouraged to examine the potential benefits that may be derived by the establishment of JRCCs to incorporate the aeronautical and maritime SAR activities and/or facilities of ARCCs/ARSCs and MRCC/MRSCs. JRCCs have the potential to not only provide a more effective SAR service to both the aeronautical and maritime industries, but also offer potential financial efficiencies by releasing funds for improvements in other SAR areas.

Note: Where JRCCs are not practicable, facilities and procedures should be developed which provide and/or enhance effective SAR coordination and collaboration between the ARCCs and MRCCs in support of each other, to provide an efficient and integrated State SAR system for both aeronautical and maritime SAR incident response.

3.9 Where practicable, the JRCC evaluation may consider consolidation of two or more different State RCCs into single sub-regional JRCCs:-

Note: a single sub-regional JRCC may be established in partnership with a group of States and serve as a 24 hour nodal JRCC supported by Joint Rescue Sub-Centres (JRSCs) of the other partner States which may not necessarily need to be manned 24 hours but could be activated when required.

ABBREVIATIONS AND ACRONYMS

ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
ADT	Autonomous Distress Tracking
ANRF	Air Navigation Reporting Form
ANSP	Air Navigation Service Provider
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
APEC	Asia Pacific Economic Cooperation
APSAR/TF	Asia/Pacific SAR Task Force
ARCC	Aeronautical Rescue Coordination Centre
ARF	ASEAN Regional Forum
ARSC	Aeronautical Rescue Sub-Centre
A/SMC	Assistant SMC
ASEAN	Association of Southeast Asian Nations
ASPOCS	Administrative Single Point of Contact for SAR
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
CONOPS	Concept of Operations
COSPAS-SARSAT	Cosmicheskaya Sistema Poiska Avariynyh Sudov -Search and Rescue Satellite-Aided Tracking
EI	Effective Implementation
ELT	Emergency Locator Transmitters
GADSS	Global Aeronautical Distress and Safety System
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
GLONASS	Global Navigation Satellite System
GPS	Global Positioning System
IAMSAR	International Aeronautical and Maritime SAR (Manual)
IMO	International Maritime Organization
IORA	Indian Ocean Rim Association
iSTARS	Integrated Safety Trend Analysis and Reporting System
JRCC	Joint (aeronautical and maritime) Rescue Coordination Centre
JRSC	Joint Rescue Sub-Centre
JWG-SAR	ICAO/IMO Joint Working Group on the Harmonisation of Aeronautical and Maritime Search and Rescue
LOA	Letter of Agreement
MCC	Mission Control Centres
MEOSAR	Medium-altitude Earth Orbit Search and Rescue
MRCC	Maritime Rescue Coordination Centre
MRO	Mass Rescue Operations
MRSC	Maritime Rescue Sub-Centre
OJT	On-the-Job Training
PQs	Protocol Questions
PSCS	Preferred SAR Capability Specifications
RANP	Regional Air Navigation Plan
RCC	Rescue Coordination Centre
RPK	Revenue Passenger Kilometres
RPAS	Remotely Piloted Aircraft Systems
SAR	Search and Rescue
SARPs	Standards and Recommended Practices
SAARC	South Asian Association for Regional Cooperation
SAREX	SAR Exercises

SC	Search and Rescue Coordinator
SCC	Search and Rescue Coordinating Committee
SMC	Search and Rescue Mission Coordinator
SMS	Safety Management System
SOLAS	International Convention for the Safety of Life at Sea
SPC	Secretariat of the Pacific Community
SPOC	SAR Point of Contact
SRR	Search and Rescue Region
SRU	Search and Rescue Unit
SWIM	System Wide Information Management
UNCLOS	United Nations Convention on the Law of the Sea
USOAP-CMA	Universal Safety Oversight Audit Programme – Continuous Monitoring Approach
VSP	Variable Set Parameter

BACKGROUND INFORMATION

Improvement Drivers

5.1 The ICAO USOAP-CMA focuses on a State's capability in providing safety oversight by assessing whether the State has effectively and consistently implemented the critical elements of a safety oversight system and determining the State's level of implementation of ICAO's safety-related SARPs, including Annex 12 Search and Rescue, and associated procedures and guidance material.

5.2 ICAO APAC Regional Office maintains an Air Navigation Deficiencies List. This list is based on the uniform methodology for identification, assessment and reporting of such deficiencies as described in Part V of the APANPIRG Procedural Handbook. By identifying and addressing specific deficiencies, APANPIRG and its Sub-groups facilitate the development and implementation of action plans by States to resolve identified deficiencies, where necessary.

5.3 The ANS Deficiency information had been populated into the ICAO iSTARS (Integrated Safety Trend Analysis and Reporting System) CHECK database and was accessible through the ICAO Secure Portal. The intention is to merge this data with the CMA Data, and manage the deficiencies using a single web-based process.

Asia/Pacific SAR System Monitoring

5.4 Significant Annex 12 compliance weaknesses had been identified within the Asia/Pacific region based upon information provided (and in many cases not provided) by States to the ICAO Regional Office. This regional information status of the SAR capability and SAR agreements was recorded in tables made available to APANPIRG, which was expected to be enhanced with the integration of SAR elements into the Seamless ATM on-line monitoring system.

ICAO Global Aeronautical Distress and Safety System (GADSS)

5.5 The tragedies of Malaysia Airlines flight MH370 in 2014 and Air France flight AF447 in 2009 highlighted vulnerabilities in the air navigation system which hampered timely identification and location of aircraft in distress, particularly in remote oceanic areas. This significantly hindered effective SAR efforts and recovery operations.

5.6 As part of the response to the Conclusions and Recommendations from the 2014 ICAO Multi-disciplinary Meeting on Global Tracking, ICAO developed a Concept of Operations (CONOPS) for a GADSS. The implementation of this target concept affects the provision of services such as air traffic control, SAR and accident investigation. It contained a large number of measures targeting improvements in SAR system response integrated within the wider ATM and aircraft/airline operations systems.

5.7 The CONOPS notes that the effectiveness of the current alerting systems and SAR services should be addressed by a number of key improvement areas. The CONOPS also included aspects which potentially involve use of different distress systems, including for example 406 MHz Emergency Locator Transmitters (ELTs) and the Cospas-Sarsat system as part of the proposed GADSS solution.

5.8 Guidance on the aircraft tracking function is provided in ICAO Circular 347, *Aircraft Tracking Implementation guidelines*. Chapter 8 outlines procedures to be followed when an operator notifies an ATSU of a missed aircraft 15 minute tracking report. This circular is for aircraft operators and civil aviation authorities, and applies to the aircraft tracking function that commenced 8 November 2018. Of particular relevance is Section 8.2 and Appendix C *Missed 4D/15 Position Report Form for Operator*. The operator is required to notify the air traffic services unit (ATSU) of a

missed aircraft 4D/15 tracking report (four-dimensional position of individual aircraft in flight at 15-minute intervals). The information that the operator has to provide the ATSU closely aligns with what the ATSU has to provide the RCC. However, the ATSU-to-RCC requirement does not have a standard form and it is not automated (machine-to-machine).

5.9 The ADT device notifies the aircraft operator (the airline) of the last known position of an aircraft that may be in a distress condition in flight. ADT activation is a notification, not a distress alert. This would be at one-minute intervals while the aircraft is in flight. The operator is responsible to make the position information available to the ATSUs and RCCs. ICAO is leading the effort to create an ADT distress tracking repository (DTR) as a database for storing the ADT information. The DTR would then notify the aircraft operator, ATSU and RCC that ADT information relevant to them is in the DTR for those stakeholders to pull the data.

5.10 The ATS unit may already be informed by other means of an emergency situation, such as from the aircrew. The aeronautical alerting process is based on the ATS unit making the decision about whether or not the aircraft is in distress and, if determined to be a distress situation, must notify the RCC immediately before contacting the operator per Annex 11. ICAO has not prescribed a specific technology for the ADT device but one of the technologies will be a new version of the aeronautical 406 MHz emergency locator transmitter – the ELT Distress Tracking ELT(DT)

5.11 ADT notifications from the ELT(DT) will be delivered directly to SAR services using the existing Cospas-Sarsat ground segment infrastructure. Having the

5.12 ADT notifications from the ELT(DT) going directly to an RCC was not the original intent of ICAO and is a major change in the aeronautical alerting process envisaged under the GADSS. RCCs need to prepare for the ADT capability and that the aircraft could remain in flight across multiple SAR regions. Appendix 1 contains specific guidance on RCC

5.13 ADT notifications from the ELT(DT). RCCs may need to update SAR practices and procedures before 1 January 2021 for concerns such as:

- accurate delimitation of SAR regions to ensure proper transfer of the SAR operation to the next responsible RCC;
- effective and efficient coordination between the ATS unit (or aeronautical RCC) and the maritime RCC;
- harmonized operations between aeronautical and maritime SAR services; and
- initial response to an ADT notifications from the ELT(DT) includes rapid contact with the ATS unit to notify and confirm if the aircraft is in distress.

Cospas-Sarsat System

5.14 Cospas-Sarsat has been developing two major enhancements to its distress-alerting System of value to all System users, including the aviation industry. One is the introduction of 2020, a new space-segment architecture based primarily on Medium-altitude Earth Orbit Search and Rescue (MEOSAR) payloads aboard the European Commission's Galileo system, the Russian Federation's Global Navigation Satellite System (GLONASS) and the United States' Global Positioning System (GPS) satellites. Another potential satellite system from China, the Beidou Navigation Satellite System, could be part of the Cospas-Sarsat Space Segment. -

5.15 This architecture would permit determination of an end-of-flight distress incident location (independent of any location data transmitted in the beacon message) beginning with the first burst from the distress beacon. This could mean near real-time and very frequent delivery of distress alerts.

5.16 The SAR/Galileo space segment would also provide a Return Link Service (RLS) that, among other possible future uses, would provide an acknowledgment from the MCC back to the beacon to confirm that the distress message has been received.

5.17 The technical specifications for the second generation 406 MHz distress beacon has been approved, including ELTs. This new generation of beacons should further improve speed and accuracy in locating an activated distress beacon. The period from beacon activation to first transmission was expected to be reduced from 50 seconds to three seconds. The specification would consider in-flight activation of ELTs when certain flight parameters were exceeded. Consequently, false alerts would affect real SAR events significantly.

5.18 States needed to continue to ensure that aviators were aware that 121.5 MHz and 243 MHz beacons cannot be detected by the global Cospas-Sarsat System and the low-power 121.5 MHz signal on the 406 MHz distress beacon was only intended as a final homing signal.

5.19 States also need to ensure the critical requirement to provide for a suitable, clear and simple means for aircraft owners to register and keep updated their 406 MHz distress beacon details.

Note: information on beacon registration is at: <http://www.cospas-sarsat.int/en/beacons-pro/beacon-regulations-pro/ibrd-user-information-for-professionals>).

5.20 Entries in the beacon register should be available to both aeronautical and maritime RCCs on a 24 hour basis (Annex 12 – *Search and Rescue* refers, although Annex 10 establishes the registration requirement).

ICAO Annexes

5.21 States should note that Annex 12 should be read in conjunction with elements of the following ICAO Annexes:

Annex 6 – Operation of Aircraft;

Annex 10 – Aeronautical Telecommunications;

Annex 11 – Air Traffic Services (particularly Chapter 5 Alerting Service); Annex 14 – Aerodromes (particularly aerodrome emergency planning with the RCC); and

Annex 19 – Safety Management (particularly SAR services under the authority of an ATS provider).

CURRENT SITUATION

Global Situation

6.1 The ICAO USOAP Report of audit results, 3rd Edition, April 2005 to August 2010 revealed a number of SAR deficiencies during the audits of 165 Member States: REVIEW AND UPDATE

- 38% of States had not laid down provisions for entry into their territory of SAR units (SRU) of other States for the purpose of search for the site of aircraft accidents and rescuing survivors;
- 44% of States had not developed a detailed plan on operation for the conduct of SAR operations within their respective Search and Rescue Regions (SRRs); and
- 67% of States had not established the necessary coordination of their SAR organisations with those of neighbouring States, including the conclusion of bi-lateral SAR agreements in order to coordinate SAR operations; and
- regarding RCCs –
 - i. about 40% of States had not developed job descriptions for their technical staff;
 - ii. 45% did not ensure that RCC personnel using radiotelephony communications were proficient in the use of the English language; and
 - iii. about 56% of States do not regularly train their SAR personnel, and nor did they conduct SAREXs.

Asia/Pacific SAR Analysis

6.2 The last decade has seen a steady increase in air traffic in the Asia/Pacific Region. Maritime traffic is also increasing, adding further urgency to ensure that States with oceanic SAR responsibilities in the region meet the requirements of both ICAO and IMO for the provision of aviation and maritime SAR services.

6.3 An analysis of the 26 Universal Safety Oversight Audit Programme (USOAP) SAR-related Protocol Questions (PQs) indicated that the overall Effective Implementation (EI) in the Asia/Pacific Region for SAR had risen from 50.7% in July 2015 to 58.99% in March 2019. **Figure 1** provides the EI of individual SAR-related PQs in March 2019.

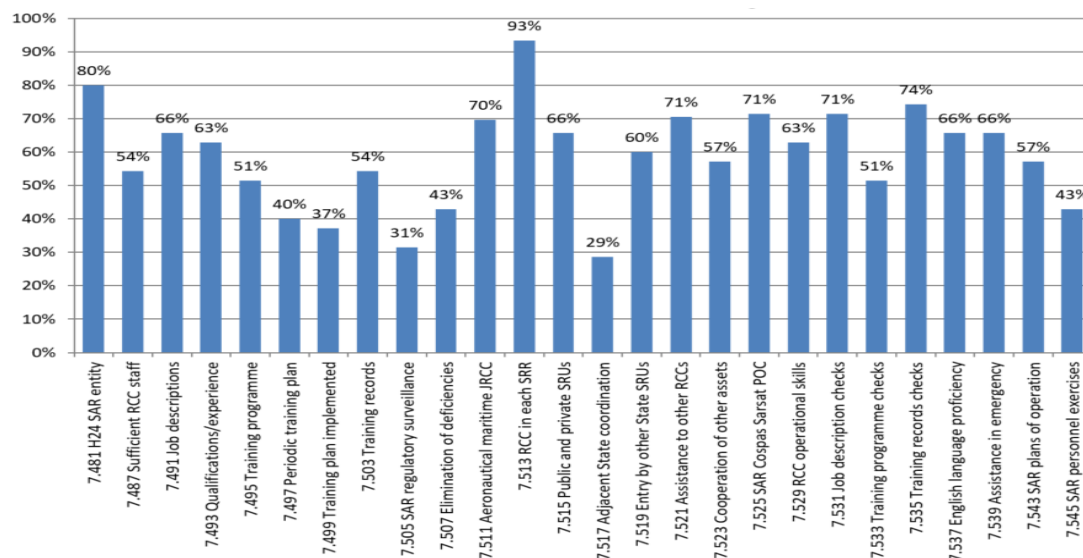


Figure 1: APAC USOAP CMA SAR PQ Compliance (average: 59%, March 2019)

6.4 From this analysis, it appeared that the major areas of weakness is in coordination with adjacent States, effective SAR oversight, and training of SAR staff that provide the SAR services. Therefore, a focus on the minimisation of barriers associated with the efficient cross-border coordination of SRU (such as pre-arranged approval) and other coordination mechanisms, including updates of SAR agreements (whatever their form) was vital. Finally, there was a need for improved systemic approaches to training for both SAR inspectors and personnel responsible for the provision of SAR services, including the regular organisation of effective SAR exercises that test systems and personnel. It should be noted that the training of SAR inspectors did not require SAR-specific technical training, but was more focused on effective audit and inspection techniques, etc.

6.5 The current analysis indicated significant Annex 12 compliance weaknesses remained in the South Asia area and the Southwest Pacific. In addition, there were parts of Southeast Asia and East Asia that indicated a need for compliance improvement.

6.6 With the advent of the Asia/Pacific SAR Plan and its more comprehensive expectations, an accurate assessment of capability aligned with the SAR Plan (was developed. This assessment could be used by States as a means of internal gap analysis, in addition to providing a more accurate metric of the Asia/Pacific SAR Plan implementation, noting that implementation was scheduled for 2019.

Asia/Pacific SAR Coordination Forums

6.7 The Asia/Pacific Region will benefit from the cooperation and coordination of States and International Organizations involved in the APSAR SAR Working Group. The establishment of permanent joint ICAO/IMO Regional SAR Forums to enable collaboration and cooperation on oceanic SAR matters across the specific oceanic regions and including adjacent ICAO regions should be considered.

6.8 There were several regional initiatives for cooperative support and development already being undertaken in the Asia/Pacific Region to assist with SAR capability enhancement.

6.9 Such improvement programmes could result from a request by a State needing assistance, ICAO/IMO oversight, the users of the SAR system itself, an audit or following a SAR ‘Go-Team’ visit that identifies weaknesses in the State’s SAR capability (a ‘Go Team’ normally consists of external SAR experts from ICAO/IMO, more advanced ‘champion’ States or external agencies such as Cospas-Sarsat). The programs can be conducted by experts from a ‘champion’ State, or through a cooperative effort by several States or a regional body.

Note: Appendix xxx provides a summary of benefits to the SAR System of States assisting other States.

Barriers

6.10 The following potential issues should be considered to ensure they do not become barriers to the achievement of the expected SAR capability:

- a) absence of established appropriate legal framework designating, recognizing, supporting and giving authority to national SAR authorities, RCCs and SMCs;
- b) inadequate funding and equipping of SAR authorities and in particular, resourcing of RCCs;
- c) absence of an appropriate SAR organizational framework;
- d) absence of a national SAR committee;
- e) lack of clarity of responsibilities for each component of the SAR system;

- f) inadequate collaboration and cooperation between aeronautical and maritime SAR agencies;
- g) absence of bilateral/multi-lateral/international SAR Agreements;
- h) inadequate civil/military cooperation; and
- i) complacency about, or lack of recognition of, the importance or priority given to SAR.

Global and Regional SAR Issues

6.11 States should monitor outcomes from global and regional ICAO and IMO SAR forums to ensure their State SAR authorities are updated on relevant SAR developments, otherwise State planning may not be synchronized with external international expectations, including users. Such forums may include APANPIRG and its Sub-Groups, other ICAO Region SAR groups, the JWG, ICAO High Level Safety Conferences, etc.

6.12 The provision of sufficient resources is critical in a number of areas, including:

- a) Financial-
 - funding for 24 hour RCC facility and staff;
 - funding for use/hire of search and rescue units; and
 - provision of a suitable administrative process enabling financial support including the ability for SAR authorities to quickly authorise payments required for emergency response aircraft, vessels and supporting logistics such as fuel.
- b) RCC personnel- a suitable number of trained and skilled staff, supplemented by a pool of trained RCC support staff where appropriate;
- c) RCC facilities-
 - appropriate RCC facility space;
 - minimum RCC tools (such as current charts, plotting equipment, documentation, etc.);
 - ability to identify and task available SRUs;
 - aircraft and vessel tracking information including ATS surveillance, Automatic Identification System, etc.;
 - reliable and rapid H24 communications, and a suitable means to-
 - receive, communicate and acknowledge distress alerts
 - communicate with ATS units, other RCCs/RSCs, Coast Radio Stations, COSPAS-SARSAT Mission Control Centres (MCCs), military units, medical services, meteorological offices, etc.;
 - information technology-
 - RCC workstation computers;
 - Software including basic databases, drift modelling, incident management, etc.;
- d) Contingency- back-up RCC facility, or arrangement with another RCC as a contingency against inability to operate from the primary RCC due to the need to evacuate or loss of systems, etc.;
- e) Search and Rescue Units (SRUs)-
 - available and suitable SAR aircraft and crews;

- funding arrangements/agreements for hiring/payment/sharing of SRUs to permit rapid deployment; and
 - Available and suitable SAR survival equipment for delivery by aircraft to survivors and to assist SAR coordination efforts (e.g.: SAR Datum Buoys, droppable life rafts and survival supplies, etc.);
- f) Training support-
- RCC staff – basic and ongoing;
 - SRU crews – pilots, air crew and air observers; and
 - RCC support staff – basic and refresher.
 - SAR inspectorate staff- basic and on-going
 - Other SAR Units- aeronautical units
 - maritime units
 - land units
 - specialised units (paramedical, divers, etc.)

PERFORMANCE IMPROVEMENT PLAN

Preferred SAR Capability Specifications (PSCS)

Note: PSCS are the non-mandatory expectations on all Asia/Pacific Region States to enhance SAR systems in order to meet a minimum level of SAR capability, with a high degree of interoperability and harmonisation, and interoperability with other ATM components such as Air Navigation Service Providers (ANSPs) and aerodrome operators, and between aeronautical and maritime SAR services. PSCS were not expected to contravene existing Annex 12 standards.

PSCS (expected implementation by 07 November 2019)

7.1 Legal Framework and Structure Planning: All States should develop statutes and related provisions that establish or enhance the legal foundation for a State SAR organization and its framework, resources, policies and procedures, where appropriate to:

- a) ensure that it is party to, and/or aligned with the following Conventions, as applicable –
 - iv. Convention on International Civil Aviation 1944;
 - v. International Convention on Maritime Search and Rescue, 1979;
 - vi. International Convention for the Safety of Life at Sea (SOLAS), 1974;
 - vii. Convention on the High Seas, 1958; and
 - viii. United Nations Convention on the Law of the Sea (UNCLOS), 1982;
- b) unless delegated by written agreement, establish an entity that provides, on a 24-hour basis, SAR services within its territories and designated area of responsibility/SRR;
- c) establish a national SAR committee consisting of civil and where appropriate, military members to enable a whole-of-government approach;
- d) empower SAR Mission Coordinators with the authority to adequately carry out their responsibilities;
- e) establish an Administrative Single Point of Contact for SAR (ASPOCS) for non-urgent, administrative matters, such details to be submitted to the ICAO Regional Office;
- f) conduct studies to check the feasibility for, and develop an implementation plan if practicable, the integration of aviation and maritime SAR activities, and as far as practicable, civil and military activities, including joint training and familiarisation of staff and review of documentation to ensure harmonisation of procedures, and joint exercises;
- g) conduct studies to align, as far as practicable, aeronautical and maritime Search and Rescue Regions (SRRs); and SRRs and Flight Information Regions (FIRs); and
- h) establish a single State SAR Plan that –
 - i. designates the responsible RCC(s), RSC(s) and 24-hour SPOC/ASPOC;
 - ii. describes the relevant SRRs, including the coordinates and geographical chart depiction of the SRR and neighbouring SRRs;
 - iii. details the National SAR Committee;

- iv. details the governmental and non-governmental agencies with authority and responsibility for SAR coordination within its territories and designated area of responsibility;
- v. details required and available SAR facilities, personnel, and equipment;
- vi. details the SAR manuals, plans and procedures for national and regional cooperative SAR response arrangements;
- vii. details the SAR personnel training and competency programme, qualification standards, SAR certification if applicable and SAR cooperation training;
- viii. details the SAR agreements required;
- ix. is electronic and accessible on the Internet, such details to be submitted to the ICAO Asia/Pacific Regional Office; and
- x. is monitored by quality assurance processes.

7.2 SAR Standards and Procedures: All States should:

- a) establish aerodrome emergency plans that provide for co-operation and co-ordination with RCCs;
- b) establish SAR agreements with States having adjoining SRRS or FIRs, including trans-regional neighbours (the agreements should include clear responsibilities for overlapping or non-adjointing aeronautical and maritime SRRs);
- c) provide up to date cross-border information on SAR capability (this should be included in bilateral SAR agreements);
- d) pre-arrange procedures for cross-border SAR responses (this should be included in bilateral SAR agreements);
- e) establish a program for regular SAREX, which may be a desktop communications exercise, with each alternate SAREX being a full exercise (this expectation may be fulfilled by participating in a sub-regional SAREX that tests the State's SAR system; and
- f) establish RCC plans for response to Mass Rescue Operations (MROs) integrated with national disaster plans;
- g) establish SAR Operations Plans between the State's SAR Authorities and Government, Military and Commercial operators including those with an over-water rotary wing or sea plane capability to include:
 - i. procedures for cooperation and deployment of foreign SRUs;
 - ii. provision for translators/liaison Officers/Embassy Officers for the daily tasking of the SRUs at the RCC;
 - iii. provision of information for logistic and administrative support (hotels, fuel, security passes, food, medicine, etc.);
 - iv. instructions on communication (ops normal reports, sightings, etc.) for search planning, command and control to foreign SRUs;
 - v. planning and arrangements that ensure the availability of State and other SRU assets, especially over-water rotary wing capability where applicable, to support a timely and effective SAR response;
 - vi. daily end of day report by SRUs to the RCC (via mobile, email, fax, etc.); and
- h) establish SAR Alerting procedures which:

- i. are tested and fully integrated with RCC procedures so that RCCs are rapidly notified of any SAR event 24 hours a day;
- ii. include procedures for joint aeronautical and maritime distress alert notification, including reliable delivery and acknowledgement of Cospas-Sarsat distress alerts, support and response to both aviation and maritime SAR incidents; and
- iii. where applicable, include protocols for civil and military support and sharing of information.

SAR Facilities and Resources

7.3 RCC Facility: All States should ensure that RCCs are of sufficient size with adequate provision for operational positions designed in accordance with human factors principles (such as human machine interface) for a major search involving civil and military assets where applicable, and facilities such as:

- a) workstations, telephones (with international access), plotting tables, wall notice/status boards, computer, and communications equipment and systems, briefing/debriefing areas room for storage including incident records and recorders, RCC staff break and rest facilities;
- b) computer resources which may provide support to RCCs with incident management, plotting, search planning, mapping, contact databases, web-based information, etc.;
- c) charts, electronic or paper, which:
 - i. apply to SAR (aeronautical, nautical, topographic and hydrographic);
 - ii. depict SRR, neighbouring SRRs, FIR(s), SAR resources and made available for all relevant aeronautical and maritime RCCs, ATS units, aircraft operators; and
 - iii. provide a means of plotting;
- d) ability to reliably receive and acknowledge distress alerts 24 hours a day;
- e) maritime broadcast facilities;
- f) a means of recording, playback and archiving of communications;
- g) shipping/vessel communications and maritime broadcast facilities such as Coast Radio Stations, RCC radio and satellite communications, marine radio networks;
- h) aircraft communications – via ATS units, aircraft operators, satellite communications or direct between RCC and aircraft;
- i) access to aircraft and ship tracking data, e.g. ATS surveillance data, Automatic Identification System and Long Range Identification and Tracking of Ships (LRIT) allowing rapid identification of potential aircraft and vessels that may divert to assist;
- j) a means of obtaining meteorological information – forecast, present and historical data;
- k) if applicable drift modelling software;
- l) if applicable, ocean data including sea temperature, currents, winds, tides, etc.;
- m) if applicable, SAR Datum Buoys, preferably with satellite tracking capability; and
- n) RCC documentation and reference material such as plans of operation, procedures manuals, guidance material, ICAO and IMO references, SAR agreements;

- o) Cospas-Sarsat equipment and reference material; and
- p) SWIM-enabled systems that can evolve the sharing of Flight Data, Aeronautical Information and MET data in alignment with contemporary practices being implemented under global and regional planning.

7.4 *Personnel and Training* All States should, where applicable to maintain a 24 hour service:

- a) provide adequate ATC resources (either an ATS supervisor or other staff) that can provide relief within Area Control Centres (ACCs) to allow timely response to SAR alerts and information to RCCs;
- b) provide sufficient RCC staffing;
- c) provide a sufficient number of trained specialist RCC officers including SMCs and Assistant SMCs (A/SMCs);
- d) provide availability of a pool of RCC support staff who are familiar with RCC operations, but not trained as coordinators, that can assist with the functioning of the RCC during SAR incident response;
- e) develop SAR personnel position descriptions that detail responsibilities and eligibility criteria for recruitment of operational staff;
- f) develop a comprehensive training programme that includes SAR training for:
 - i. RCC SAR Coordinators (SCs) based on a competency-based assessment approach to ensure technical and English language proficiency, cyclical (periodic) instruction that provides continuous training to ensure competency is maintained, and a system for maintaining training records; and
 - ii. SRU staff, including military personnel.
- g) facilitate RCC staff to be proficient in the English language; and
- h) facilitate a programme of regular liaison visits between relevant RCCs, ATC units and airline operating centres in order to understand those organizations, facilities and capabilities (reference Annex 12, paragraph 3.1.9).

7.5 *Oceanic Capability*: Where applicable, States should establish additional oceanic SAR capability as far as practicable to ensure a timely and adequate SAR response is available to all oceanic areas of their SRRs. This may be met through cooperative arrangements with neighbouring States or other RCCs.

7.6 *Search and Rescue Units*: All States should establish capabilities enabling:

- a) availability and deployment of suitably crewed, trained and equipped SRUs (including a pool of air search observers trained in visual search techniques), public and/or private, civil and military, for rapid SAR response;
- b) availability and deployment of SRU craft that may be in use for another primary purpose but made available to RCCs for SAR purposes on an as needed emergency basis (vessels, aircraft and land units);
- c) protocols for civil SAR authorities to request the assistance of military assets, and similarly military SAR authorities to request civil assets;
- d) a communication means and information protocols between the State's Aeronautical and Maritime SAR Authorities;
- e) cooperative use and/or sharing of SAR assets with protocols incorporated within National SAR Plans and bilateral SAR Agreements;

- f) pre-arranged government authority for funding of costs associated with hiring of SRUs, and payment for critical supporting logistics such as fuel, to avoid any delays in response availability;
- g) pre-approval of specified SRU assets that may be utilised cross-border (requiring diplomatic pre-approval) or cross-SRR boundary (which may not require diplomatic approval if operating within international airspace); and
- h) aircraft with the ability and regulatory approval to safely conduct SAR missions.

Note: guidance material on SAR aircraft capability is found in the IAMSAR manual.

7.7

Distress Beacons: All States should:

- a) where separate ARCCs and MRCCs exist with responsibility for coincident aviation and maritime SRRs, coordinate distress beacon alert procedures to ensure both RCCs are aware of any distress beacon activations within their areas to avoid duplication of response. For example, MRCCs should ensure their procedures alert ARCCs and ATS units to any EPIRB activations;
- b) have a reliable distress beacon registration system that:
 - i) provides a readily-accessible mechanism (preferably one that is available by Internet as well as other conventional means) to enable distress beacon owners to fulfil their obligation to register ELTs, EPIRBs and PLBs, and update the registration data as information changes (e.g., change in ownership);
 - ii) is available to RCCs 24 hours a day and includes up-to-date registration details for all national civil and military ELTs, EPIRBs and PLBs;
- c) take steps (including education) required to prepare for, and to implement changes related to, the introduction of second generation beacons, the transition to the MEOSAR satellite architecture, and the pending Return Link Service provided by the Galileo constellation;
- d) establish an appropriate nationwide means of disposal for old distress beacons; and
- e) conduct promotional programmes, including, where appropriate, with airworthiness agencies and civil aviation authorities, related to the minimization of false alerts. .

Note 1: Information on beacon registration is at: <http://www.cospas-sarsat.int/en/beacons-pro/beacon-regulations-pro/ibrd-user-information-for-professionals>.)

Note 2: Incorrect disposal of distress beacons often causes the deployment of scarce and often expensive SAR resources only to have the beacon located as a non-distress event in a rubbish dump or similar location. This also creates the risk of SAR resources being diverted away from a real emergency should it arise at the time. Beacon batteries are hazardous items which should be disposed of in an environmentally friendly manner.

Note 3: Education should include matters such as an update on beacon registration systems to be compatible with new beacon hexadecimal identifications, the transition to the MEOSAR satellite architecture (e.g.: update local user terminals and mission control centres to properly receive and manage MEOSAR data), in accordance with Cospas-Sarsat specification documents (<http://www.cospas-sarsat.int/en/documents-pro/system-documents>).

7.8

Contingency Facilities: All States should ensure there are established contingency facilities, or when a SAR service is not able to be provided, procedures in place for the temporary delegation of the SAR responsibility to another appropriate national body or State. All States should test their contingency arrangements periodically, but not less than once every six months.

SAR Information

- 7.9 Provision of Information: All States should ensure the:
- a) establishment of a centralised information source publishing all Asia/Pacific State Aeronautical Information Publication (AIP) information:
 - i. The agency responsible for providing SAR services;
 - ii. The area of SAR responsibility where SAR services are provided;
 - iii. The type of SAR services and facilities provided including indications where SAR aerial coverage is dependent upon significant deployment of aircraft;
 - iv. SAR agreements;
 - v. The conditions of SAR facility and service availability; and
 - vi. SAR procedures and signals used;
 - b) establishment of an Internet-based SAR information sharing system (with security protocols as required and in accordance with the emerging System Wide Information Management – SWIM concept as applicable) to share SAR activity with States and key stakeholders participating in a SAR activity (the information sharing system should include a means of handling media and next of kin enquiries, and recognise the need to avoid premature media statements); and
 - c) maximum practicable cooperation between State entities in the provision of accurate and timely information when required, including from military sources except where national security could be adversely affected.

7.10 SAR Facilities and Equipment Lists: All States should develop and maintain a current, comprehensive electronic list of State SAR Facilities, SAR Equipment, and SAR Units (SRUs), including joint or shared facilities and equipment, and provide the Internet link to that list to the ICAO Asia/Pacific Regional Office.

- 7.11 SAR Library: All States should:
- a) establish a web-based SAR Library, or cooperate by contributing to an Internet-based Asia/Pacific resource (such as <https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Response-Policy-CG-5R/Office-of-Incident-Management-Preparedness-CG-5RI/US-Coast-Guard-Office-of-Search-and-Rescue-CG-SAR/SAR-Publications/>); and
 - b) ensure that each RCC and SAR Authority has ready access to a current copy (either electronic or hard copy) of the following reference documents at a minimum:
 - i. ICAO Annex 12;
 - ii. IAMSAR Manual Volumes I, II and III;
 - iii. International Convention on Maritime SAR (SAR Convention);
 - iv. Asia/Pacific SAR Plan/electronic Air Navigation Plan; and
 - v. relevant regional, national and agency SAR documents.

Note: The Asia/Pacific SAR Library hosted by the US Coast Guard contains a list of documents that may be held by RCCs and JRCCs as appropriate. In addition, a list of documents (SAR.7/Circ.12) would be available on the IMO web site at: (<http://www.imo.org/en/OurWork/Safety/RadioCommunicationsAndSearchAndRescue/SeArchAndRescue/Pages/Default.aspx>).

SAR Improvement

7.12 *Search and Rescue Exercises (SAREX)*: All States should conduct regular SAREX (at least once every two years) to test and evaluate existing coordination procedures, data and information sharing and SAR response arrangements involving:

- a) both aeronautical and maritime SAR authorities including both civil and military agencies as applicable, and related bodies such as Air Navigation Service Providers (ANSPs) and Airline Operations Centres (AOCs);
- b) where appropriate, cross-aeronautical SRR boundary coordination (SAREX should routinely involve SAR authorities of adjacent SRRs); and
- c) SAREX effectiveness through a post-SAREX review and written report, completed to ensure that deficient areas or latent problems are identified and remedied.

Note 1: a SAREX template is provided in the 2019 edition of the IAMSAR Manual, Volume I, Appendix O, Sample template for a joint SAREX.

Note 2: SAREX should test the SAR system, including unannounced alerts that allow an actual search (whether it is a desktop or a physical operation), to be conducted which will indicate weaknesses in the system. SAREX should not be confused with, or take the form of, simulated crash fire exercises such as for Aerodrome Emergency Procedures that do not have a search component.

Note 3: Real SAR incident responses which include an adequate post-response review and evaluation with lessons learned may replace the need for a SAREX.

7.13 *SAR Quality Assurance*: All States should implement SAR System Improvement and Assessment measures, including Safety Management and Quality Assurance systems, that:

- a) provide performance and safety indicators, including post-incident/accident lessons learned and management reviews (RCC and SAR System Continuous Improvement process), and feedback from RCC staff, SAR system users or SAR stakeholders;
- b) identifies risk and corrective and preventive actions that prevent or minimise risk and the possibility of substandard SAR performance;
- c) establishes an internal quality assurance programme, which includes regular internal audits of the RCC, SAR operations, SAR facilities and procedures that are conducted by trained auditors;
- d) ensures the person responsible for internal quality assurance within the entity responsible for SAR services has direct access to report to the Head of the entity responsible for SAR services on matters of quality assurance; and
- e) where appropriate, provides submissions to the JWG to share lessons learned and experiences with other global States for the continuous improvement of the worldwide SAR system.

Note 1: Resourcing of SAR system audit arrangements could be mitigated by States entering cooperative arrangements, including sub-regional regulation, between States for auditing of each other's SAR systems to share expertise and costs.

Note 2: Provisions of Annex 19 for a Safety Management System (SMS) may apply where a SAR service is provided under the authority of an ATS provider (Annex 19, Chapter 3, 3.1.3 e refers).

Note 3: Peer review, either external or internal, may provide a useful internal quality assurance tool.

7.14 *SAR Management Review*: All States should conduct an annual or more frequent analysis of their current State SAR system to identify specific gaps in capability against the minimum requirements of Annex 12 and the guidelines of the IAMSAR Manual to:

- a) enable the ICAO Asia/Pacific SAR data to be updated to accurately reflect the State's capability;
- b) be informed regarding the availability and capability of SAR services in neighbouring States;
- c) identify SAR research and development programmes, especially those which could be conducted if possible in cooperation with other States;
- d) establish a common set of basic SAR system statistics, which include-
 - i. number of SAR incidents per year;
 - ii. number of lives at risk versus number of lives saved;
 - iii. records of time from first alert to tasking the SRU;
 - iv. records of time from first alert to arrival on scene of first SRU; and
 - v. records of time from first alert to rescue.
- e) plan for any necessary improvements to gradually build and improve capability over time, which would be detailed in the State SAR Plan; and
- f) regularly review and update SAR agreements as appropriate.

Note 1: The National self-assessment on SAR found in IAMSAR Manual Vol I Appendix H and the ICAO USOAP-CMA Protocol Questions for SAR may assist States with their reviews.

Note 2: The number of incidents should identify the type (e.g.: Cospas-Sarsat alert, ATS alerts, etc.) and outcome of SAR incidents.

7.15 *SAR Promotion*: All States should conduct SAR promotional programs (e.g. Seminars, Workshops and public safety campaigns) to:

- a) encourage higher SAR preparedness by persons that may require SAR services through public safety campaigns aimed at preventing persons getting into distress situations (i.e.: 'preventative SAR');
- b) ensure the support of government decision-makers for SAR facilities and improvements, in particular adequate funding availability;
- c) assist media to understand SAR operations in order to minimise the need for explanations during SAR responses;
- d) recognise improvement in State SAR systems;
- e) enhance cooperation between SAR services and –
 - i. civil, military and police agencies;
 - ii. ANSPs;
 - iii. aerodrome and port operators;
 - iv. aircraft and shipping operators;
 - v. meteorological agencies;
 - vi. accident investigation agencies;

- vii. government and non-government agencies affected by SAR operations, in particular large scale national and international responses involving whole of government agencies and
- viii. other States.

Note: social media may be an effective means of SAR promotion that reduces the workload of SAR staff during major SAR responses.

EMERGING ISSUES AND FUTURE DEVELOPMENTS

Planning for the Future

(New numbering required) States should monitor developments such as improvements to existing and new technologies and other emerging matters which may impact on the SAR system of the future as part of State, regional and global aviation strategic direction and planning. This may include matters such as:

- the need to cater for increased growth or changes in air and maritime traffic through SAR regions which may increase the demand, or present changed capability requirements, for SAR services. This may include, for example, new air routes using longer range aircraft into more remote areas or increased numbers of, and/or larger, cruise ships; and
- new technology such as UAS, autonomous vessels, new distress alerting devices and systems.

Research and Development

8.1 To develop the tools and systems required to meet foreseeable long-term requirements, there is a need for States to undertake planning and co-operation on SAR matters. This includes major efforts to define concepts, to extend knowledge and invent new solutions to future SAR challenges so these new concepts are selected and applied in an appropriate timely manner. Such efforts could be forged through collaborative partnerships between, States, ANSPs, International Organizations, institutes of higher learning and specialised technical agencies. This concept is consistent with Seamless ATM Principle 36 (*Inter-regional cooperation ('clustering') for the research, development and implementation of ATM projects*), and may manifest itself in joint projects such as:

- ICAO and/or IMO regional SAR training opportunities where provided to assist States that are unable to provide their own SAR training;
- Joint Sub-regional RCCs (ASEAN States in particular may be candidates for a single centre of excellence that brings together civil and military SAR experts from all ASEAN States and provides a single SAR facility that is cost-effective and has a level of resources and facilities that would be difficult for all States to maintain by themselves); and
- Regional online eLearning packages.

Note: Appendix 2 provides a summary of benefits to the SAR System of States assisting other States.

8.2 With the end goal of a globally interoperable SAR system in mind, the region will have to consider planning for a long term supporting concept and infrastructure. The following are possible areas that should be considered for future SAR research and development, in order to promote the maximum possible harmonisation and interoperability of SAR systems:

- a) data sharing such as aircraft and ship tracking information;
- b) automated data link communication to RCCs when an aircraft or ship exceeds a Variable Set Parameter (VSP) in terms of its operating envelope, or activation of an emergency status (could be displayed as a symbol, and the data could include certain operating parameters such as acceleration and altitude for an aircraft) – note the ICAO GADSS includes this concept;
- c) regional UAS and autonomous vessels for use in SAR;

- d) inclusion of the SAR system and RCC access as a component of the new ICAO SWIM concept of operation and implementation;
- e) on-going development of standardised SAR training objectives and advanced training systems, including the use of high fidelity simulators;
- f) enhanced technology oriented systems to improve SAR system effectiveness; and
- g) transition to MEOSAR System and second generation beacons.

MILESTONES, TIMELINES, PRIORITIES AND ACTIONS

Milestones

9.1 Section 7 (*Performance Improvement Plan*) provides a scheme for the implementation of a collective set of enhancements for a number of elements in the PSCS, effective 07 November 2019.

9.2 States should commence planning for the various PSCS elements from the approval of this Plan, to ensure a smooth transition by 07 November 2019, and should include consideration of issues such as:

- safety/operational analysis and assessment;
- cost-effectiveness;
- budgetary issues;
- development of operational procedures; and
- training.

9.3 Section 8 (*Research and Future Development*) provides, subject to future agreement by concerned parties, possible SAR improvements beyond 2020 until 2030.

Priorities

9.4 It is a matter for each State to determine priorities in accordance with its own economic, environmental, safety and administrative drivers.

Actions

9.5 This Plan necessitates a number of implementation actions. It is expected that each Asia/Pacific State report progress on each applicable element to APANPIRG. All States should note the importance of SAR status monitoring, which is expected to be conducted as part of the Seamless ATM on-line monitoring. Reporting of implementation progress of SAR elements from this Plan is expected to be conducted by the on-line Seamless ANS Reporting and Monitoring system, once this system is enabled to include the subsidiary plan such as the Asia/Pacific SAR Plan.

9.6 Section 6 (*Current Situation*) provides analysis and major concerns in the region, which should be considered in the formulation of specific State plans.

9.7 SAR Coordination Forums, which are likely to be based on sub-regional development (such as a Pacific Ocean SAR Forum and Indian Ocean SAR Forum) need to be promoted, established and supported to ensure the on-going implementation work and future review of SAR expectations linked to this Plan are conducted.

SAREX

9.8 A program is expected to be established for an annual SAREX in each sub-region (South Asia, Southeast Asia, East Asia and the Pacific), with every second year being a desktop communications exercise, and alternate years being a full exercise. The SAREX outcomes and lessons learned should be reported to APANPIRG through the ATM Sub-Group.

9.9 The ICAO Asia and Pacific Regional Office is responsible for taking actions that assist the implementation of SAR within its accredited States, in cooperation with the IMO. In addition, the Asia and Pacific Regional Office was responsible for coordinating with adjacent ICAO regional offices on an ad hoc basis or at relevant trans-regional meetings.

APPENDIX 1: RCC PROCEDURES FOR AUTONOMOUS DISTRESS TRACKING (ADT) SIGNALS

Asia/Pacific States and territories need to prepare for the implementation of functions of the Global Aeronautical Distress and Safety System (GADSS). GADSS applies to certain passenger and cargo aircraft. The first phase commenced 8 November 2018 for the aircraft tracking function of automated reporting of position at least every 15 minutes. The next phase commences 1 January 2021 for the autonomous distress tracking (ADT) function of reporting at least once every minute. It is possible for the ADT to transmit as the aircraft flies across multiple SAR regions and flight information regions WP13 US comments change ADT to ...

The sharing of GADSS alerting information requires global coverage and a global interoperable systems approach. Aircraft tracking and ADT alert information for aircraft emergency conditions need rapid distribution to the aircraft operator, responsible ATSU and the responsible RCC. Effective sharing of this information to the responsible stakeholders requires well defined, accurate and readily accessible global flight information region and SAR region data, plus reliable 24-hour contact details for the aircraft operators, ATSUs and RCCs. For many States, these are key areas needing improvement to enable effective SAR response. And, territories which may not have an RCC but have an international airport, need to be prepared to correctly react when an RCC or ATSU informs it of such a possible inflight emergency.

RCC Procedures for no later than 1 January 2021

The RCC will greatly benefit from autonomous distress tracking (ADT), which provides timely detection of an aeroplane in distress and the last known location of the aeroplane. Current RCC processes are established under the provisions of ICAO Annex 11 and ICAO Annex 12 – *Search and Rescue*, and apply to the aeronautical RCC (ARCC). However, the International Convention on Maritime SAR also established a global maritime search and rescue system but uses maritime RCCs (MRCCs). To ensure close coordination between the aeronautical and maritime SAR services, States are expected to either establish a joint RCC (JRCC) or to ensure the closest practicable coordination between the ARCC and MRCC.

Note: In this plan, the term RCC will be used to apply to an ARCC, MRCC or JRCC.

While the ADT process is new, it is anticipated that the alerting process for the RCC will not fundamentally change.

The distress alert notification processes associated with ADT, based on ICAO Annex 11, Chapter 5 can be summarized as follows:

- if an ATSU detects an aeroplane in distress it will notify the RCC and the operator;
- if the operator detects an aeroplane in distress, it will notify the ATSU who will in turn notify the RCC;
- if an ELT is activated, the RCC will be notified via the Cospas-Sarsat system and the RCC will subsequently notify the ATSU and the aircraft operator;
- ADT notifications, including from the ELT(DT), provide the last known position of an aircraft that may be in a distress condition in flight; and, the aircraft operator, ATSU and RCC will be notified when the information is available from the ADT distress tracking repository; and

- The RCC should confer with the ATSU to decide if the ADT notification is a distress alert. It may be appropriate to consider this as in at least the uncertainty phase until further information is provided by the ATSU or aircraft operator.

As specified in Annex 11, Chapter 5, not only is the ATSU expected to notify the RCC immediately when an aeroplane is considered to be in a state of emergency, the notification is expected to contain as much as is available of information listed in that chapter. This list of information closely aligns with content of the “Missed 4D/15 Position Report Form for Operator” that the operator should provide in notifying an ATSU, as identified in ICAO Circular 347, *Aircraft Tracking Implementation Guidelines*, Chapter 8 – *Operator Missed Reports Notifications to ATS Unit*. CHECK WITH HQ

Once notified of a distress, the RCC will initiate action based on preparatory measures and operating procedures set forth in Annex 12. Under preparatory measures, the RCC is required to have readily available at all times up-to-date information concerning its search and rescue region, including ATSU addresses and telephone numbers of all operators, or their designated representatives, engaged in operations in the region, and MRCCs which are not part of a JRCC.

If the ATSU was not the notification source, the RCC should contact the ATSU to confirm the possible distress and have the ATSU gather further information, which would be the list of information in Annex 11 and the most recent 4D aeroplane position data leading up to the ADT activation. These actions are taken concurrently as the RCC immediately initiates search and rescue actions. When the information concerning the emergency is received from another source, such as the ELT alert going directly to the RCC via the Cospas-Sarsat system, the RCC will notify the associated ATSU and also notify the operator, where possible, and keep the operator informed of all developments. (The MRCC does not have a requirement to notify the operator but should try to have arrangements in place to notify or seek the support of the ARCC or ATSU to notify the operator.)

The responsible RCC and the associated ATSU serving the flight information region (FIR) in which the aeroplane is operating coordinate their activities and work closely together. The RCC is expected to provide that ATSU with planned SAR action initiated by the RCC so that such information can be passed to the aeroplane.

If the aeroplane in distress continues in flight and crosses into other SAR region(s), the first RCC originally notified will contact and coordinate with the other RCC(s) to decide which RCC will have responsibility to coordinate the SAR operation. If coordination is handed off to another RCC then its associated ATSU would be expected to support that RCC.

The RCC and ATSU will keep each other informed as to changes in the emergency phase after the initial declaration as well as if the aeroplane has resumed normal operations or safely landed, and, as soon as practicable, notify the operator concerned.

APPENDIX 2: BENEFITS TO THE SAR SYSTEM OF STATES ASSISTING OTHER STATES

APAC States Face Demanding SAR Responsibilities with Few Resources

2.1 Many APAC States have the challenging responsibility of providing SAR services over vast and remote land and oceanic areas and several have few resources available to meet Annex 12 requirements.

Taking A Regional Approach Improves Effectiveness and Efficiency

2.2 To provide an effective and efficient SAR service in the region it is important that States focus not only on meeting their own national obligations, but also take the broader view that their State SAR system is only one part of the wider regional SAR system. States therefore need to cooperate, collaborate and share resources and technical expertise with their neighbouring and regional RCCs, with the more developed SAR States in particular looking for opportunities to assist their lesser developed State neighbours.

When Developed SAR States Support Less Developed Neighbours, Everyone Wins

2.3 Sometimes simple measures can reduce the incidence of SAR operations in a State's Area of Responsibility.

2.4 An example of this is where New Zealand has been regularly requested to send resources to Kiribati, which is not in New Zealand's SRR, to conduct aerial searches for people missing in small vessels at sea. New Zealand recognised that with the provision of basic aids, the number of people going missing at sea could be reduced. The work was completed through an aid program and the benefit was immediate and twofold. There has been a large reduction in the number of people going missing at sea and New Zealand has reduced costs through less aerial searches being required.

2.5 Another example is where Australia has recognised that increasing aircraft and vessel traffic in the north and western areas of its SRR in the Indian Ocean region comes with increased likelihood of more frequent SAR responses in that region. As a result, Australia has commenced a new project in partnership with the Maldives, Mauritius and Sri Lanka to fund and provide technical assistance to improve the SAR capabilities of those countries that will also assist Australia's SAR response obligations in that area of its SRR. Similarly, since 2008 Australia has been providing funding and development assistance to Indonesia to improve SAR capability and cooperation.

2.6 States who aren't compliant with Annex 12 SARPs and who are unable to meet the minimum SAR service requirements could consult and seek assistance from 'champion' States who are compliant and have well developed SAR systems in place.

2.7 Examples of assistance that could be provided by States, International Organisations (such as IMO and ICAO) or multi-lateral initiatives include:

- a) conducting of a SAR Gap Analysis;
- b) advice on the establishment of a SAR organisational framework;
- c) advice for the establishment of a National SAR Committee;
- d) technical assistance in the development of a National SAR Plan;
- e) providing copies of relevant SAR documents to be used as templates;
- f) technical assistance on the establishment of SAR agreements;
- g) technical assistance in the development of RCC position descriptions;
- h) training of SAR personnel;

- i) provision of SRU where appropriate and training of SRU crews;
- j) provision/sharing of computerised SAR tools including incident management systems, databases, maritime drift modelling software, etc.;
- k) establishing data and information sharing agreements between RCCs;
- l) provision of operational search plan data;
- m) providing advice on how to conduct a SAREX and post-SAREX analysis; and
- n) set up of SAR system publicity and safety awareness campaigns.

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