ICAO/IMO JOINT WORKING GROUP
ON HARMONIZATION OF AERONAUTICAL
AND MARITIME SEARCH AND RESCUE (ICAO/IMO JWG-SAR)

TWENTY-SECOND MEETING

Royal Canadian Air Force Base, Trenton, Canada, 14 to 18 September 2015

SAR COMMUNICATIONS

Report on Cospas-Sarsat System Status, Operations and Future Developments

(Presented by Cospas-Sarsat)

SUMMARY

Executive summary: This document provides information on the status of the International Cospas-Sarsat Programme as at 14 August 2015.

Action to be taken: Paragraph 17.

SYSTEM OPERATION

1 In 2014, based on preliminary information, Cospas-Sarsat alert data assisted in 685 distress incidents (720 in 2013) and 2,354 persons were rescued (2,156 in 2013). Since September 1982, the Cospas-Sarsat System has provided assistance in rescuing at least 39,565 persons in 11,070 SAR events.

2 The geographic distribution of all reported SAR events for which Cospas-Sarsat alert data was used in 2014 is presented in Figure 1 and the distribution of all SAR events (maritime, aviation and PLB) for the period from January to December 2014 is shown at Figure 2. Participants often provide recent SAR cases supported by Cospas-Sarsat for publication on the
Based on the data provided by participants, Cospas-Sarsat calculates two false alert rates, identified for convenience as the “SAR false alert rate” and the “beacon false alert rate”. The SAR false alert rate, which characterises the impact of false alerts on SAR services, is the percentage of false alerts plus undetermined alerts (no person in distress found; no beacon found) over the total number of alerts transmitted to SAR authorities. Table 1 below shows the evolution of the false alert rate computed from a SAR perspective. Table 2 below shows the evolution of the 406 MHz beacon false alert rate (ratio of false plus undetermined alerts over the beacon population) since 2010. In 2014, the false alert rate was 96.5%, i.e. about one real alert in 25 alerts received.

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>95.3%</td>
</tr>
<tr>
<td>2011</td>
<td>96.3%</td>
</tr>
<tr>
<td>2012</td>
<td>96.0%</td>
</tr>
<tr>
<td>2013</td>
<td>95.0%</td>
</tr>
<tr>
<td>2014</td>
<td>96.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>EPIRBs</th>
<th>ELTs</th>
<th>PLBs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1.2%</td>
<td>8.4%</td>
<td>0.6%</td>
</tr>
<tr>
<td>2011</td>
<td>1.1%</td>
<td>5.3%</td>
<td>0.6%</td>
</tr>
<tr>
<td>2012</td>
<td>0.9%</td>
<td>4.9%</td>
<td>0.4%</td>
</tr>
<tr>
<td>2013</td>
<td>0.9%</td>
<td>5.0%</td>
<td>0.4%</td>
</tr>
<tr>
<td>2014</td>
<td>0.8%</td>
<td>4.5%</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

**ANALYSIS OF CHANGES IN SYSTEM STATISTICS**

In 2011 a new method of estimating total beacon population was adopted:

\[
\text{Registered beacon population} / \text{Registration rate} (\%) \times 100 = \text{Total Beacon Population}
\]

where Registration Rate = Number of Detections / Number of Detected Beacons that are Registered

This new methodology particularly affected the ELT population, where division of the registered population by the low registration rate shown in some cases for ELTs resulted in a large increase in the beacon population. In 2012, very low registration rates (those calculated to be less than 40%) were replaced with a standard registration rate of 70%, when other data did not indicate the real registration rate was very low. These changes in calculation of ELT population had a significant impact on the ELT false alert rate; however, the ELT false alert rate remains much higher than that of other beacon types.
5. Figure 3 shows the number of SAR events and persons rescued with the assistance of Cospas-Sarsat alert data for the period from January 1994 to December 2014.

![Figure 3: Number of SAR Events and Persons Rescued with the Assistance of Cospas-Sarsat Alert Data (January 1994 to December 2014)](image)

**406 MHZ BEACONS**

6. Based on estimates made by Administrations using a formula based on beacons registered modified by a calculated registration rate, there were approximately 1,778,419 beacons operating at 406 MHz in use worldwide at the end of 2014, up 8.3% from 2013, slightly lower than the growth rate in recent years (2013 (9.9%), 2012 (13.1%)). The ratio of production of beacons capable of acquiring position data from radio navigation satellites (such as GPS and Glonass) and encoding this position information into the transmitted alert data (“location protocol beacons”) remained consistent, at 67.6% in 2013 and 66.7% in 2014. A performance measure instituted by Cospas-Sarsat in 2009 assesses “percentage of detected beacons that are registered”. This data is shown in Table 3.
### Table 3: Percentage of Detected Beacons that are Registered (2010 - 2014)

<table>
<thead>
<tr>
<th>Year</th>
<th>EPIRB</th>
<th>ELT</th>
<th>PLB</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of beacons registered / Number of detections</td>
<td>Percent (%)</td>
<td>Number of beacons registered / Number of detections</td>
<td>Percent (%)</td>
</tr>
<tr>
<td>2010</td>
<td>4,911 / 6,624</td>
<td>74.1</td>
<td>6,147 / 9,438</td>
<td>65.1</td>
</tr>
<tr>
<td>2011</td>
<td>4,879 / 6,264</td>
<td>77.9</td>
<td>6,631 / 10,102</td>
<td>65.6</td>
</tr>
<tr>
<td>2012</td>
<td>5,136 / 6,445</td>
<td>79.7</td>
<td>6,573 / 10,013</td>
<td>65.6</td>
</tr>
<tr>
<td>2013</td>
<td>4,879 / 6,264</td>
<td>77.9</td>
<td>6631 / 10,102</td>
<td>65.0</td>
</tr>
<tr>
<td>2014</td>
<td>4,833 / 6,414</td>
<td>75.4</td>
<td>7,007 / 10,441</td>
<td>67.1</td>
</tr>
</tbody>
</table>

7 Cospas-Sarsat operates the International 406 MHz Beacon Registration Database (IBRD, [www.406registration.com](http://www.406registration.com)) which is freely available to users with no access to national registration facilities. By allowing their beacon users to register beacons in the IBRD, Administrations help to facilitate proper registration by beacon owners while avoiding administrative costs and inconvenience to their governments. Administrations may also avail themselves of the facility to upload their national beacon registration data to the IBRD to ensure that it is available 24/7 to other SAR services when they receive alerts from active beacons in their SAR area of responsibility. As at 1 August 2015, there were 51,788 beacons registered in the IBRD (46,799 at 1 August 2014) from 118 Administrations. On average 320 SAR users per month (2012 - 346, 2013 - 314, 2014 - 308, 2015 - 315) log into the IBRD to search for beacon registration information.

8 Guidance on the Cospas-Sarsat International 406 MHz Beacon Registration Database (IBRD), adopted at the ninety-fourth session (17-21 November 2014) of the IMO’s Maritime Safety Committee is included for information at [Attachment 1](#) to this document.

**LEOSAR AND GEOSAR SYSTEMS**

9 As of 14 August 2015, five LEOSAR and seven GEOSAR spacecraft were in operation, supported by 54 LEOLUTs, 23 GEOLUTs and 31 MCCs.

10 Full details of the operational space and ground segments are available on the Cospas-Sarsat website.

**PERFORMANCE MEASUREMENT: COSPAS-SARSAT ASSISTED SAR EVENTS**

11 As part of its Quality Management System, and to meet the goals and objectives of its strategic plan, Cospas-Sarsat developed a set of performance measures. Because the purpose of Cospas-Sarsat is to assist in the saving of lives, a performance measure of the evolution of the number of SAR events annually where Cospas-Sarsat assisted and provided the only alert...
was developed to evaluate the relevance of the System. Figure 4 provides twenty five years of data and clearly indicates the continued relevance of the Cospas-Sarsat System.

Figure 4: Annual Number of SAR Events where Cospas-Sarsat Assisted or Provided the Only Alert (1990 - 2014)

SYSTEM ENHANCEMENTS

12 Future enhancements to system operations continue to focus primarily on development of technical specifications for second-generation beacons and the next-generation space system, MEOSAR. Highlights of developments of interest to SAR providers agreed at the twenty-eighth meeting of the Cospas-Sarsat Joint Committee, which were reviewed and generally agreed at the fifty-third session of the Open Council, were reported in document ICAO/IMO JWG-SAR/21-WP/18. The twenty-ninth meeting of the Joint Committee will be held on 21-30 September 2015 in Montreal.

13 Items of particular continuing interest to this meeting of the ICAO/IMO Joint Working Group on SAR (JWG) may include:

- that the Cospas-Sarsat Secretariat transmitted a liaison statement to IMO regarding a modification to IMO Resolution A.810(19) that would allow the duty cycle of the 121.5 MHz homing signal to be reduced to 30 percent, as specified in ITU Recommendation ITU-R M.690-1, to enable the interleaving of other current and emerging technology signals and methodologies that offer the potential for a more capable and effective homing process, while concurrently preserving the 121.5-MHz legacy homing signal for those administrations that currently remain dependent on that signal for homing and on-scene locating;

- the decision of the IMO’s Sub-Committee on Navigation, Communication and Search and Rescue (NCSR), at its second session, agreeing with the JWG that keeping the same level of performance of the 121.5 MHz final homing capability was the area of concern and that evidence was needed that the proposed modification of the current IMO requirement for a
continuous 121.5 MHz homing signal would have no detrimental effect on 121.5 MHz homing capability, and that this should be demonstrated through appropriate testing, which should be documented and provided for review when the Sub-Committee would consider the revision of resolution A.810(19) at a future session (note that it has been requested by Cospas-Sarsat that the results of such testing be provided to the twenty-ninth meeting of the Cospas-Sarsat Joint Committee (21-30 September, with a working paper deadline of 24 August);

• that the JWG had received a request from Cospas-Sarsat to indicate how long raw data received at earth stations should be kept available for the benefit of accident investigations in order for Cospas-Sarsat to plan for the storage of raw data for such an amount of time as might be needed, and the JWG’s Recommendation 21/4 that ICAO and IMO provide the required period of time for storage of Cospas-Sarsat data related to accident investigations, and that the IMO’s NCSR 2 had requested that the JWG further consider the matter and make recommendations back to NCSR 3.

STATUS OF THE MEOSAR SYSTEM DEVELOPMENT

14 MEOSAR development continues, following the January 2013 commencement of the technical tests of Phase I of the MEOSAR Demonstration and Evaluation (D&E). The JC-28 Meeting, TG-2/2015, TG-3/2015 and the fifty-third and fifty-fourth session of the Council discussed D&E test results available to date, including results from operational testing which commenced with Phase II of the D&E in April 2015. The Council decided to introduce into the MEOSAR implementation timeline a new, intermediate phase prior to the Initial Operational Capability (IOC), defined as Early Operational Capability (EOC). The Council anticipates a decision at its meeting in December 2015 to begin MEOSAR EOC transition, with an EOC declaration possible at the Council session in December 2016. The Council will formally advise stakeholders, including ICAO and IMO, on transitions to operational configurations as the decisions are made.

15 The following table depicts the MEOSAR satellite constellation as at 14 August 2015, including planned future launches:

- Diagram of the MEOSAR satellite constellation.

Notes:
1. SAR/Galileo: The first 30 Galileo satellites carrying a total of 28 SARR instrument are planned to be deployed between 2012 and 2019.
2. SAR/Glonass-K: SARR instruments planned to be carried on the Russian GNSS Glonass-K1 and Glonass-K2 satellites.
3. SAR/GPS: Negotiations are underway to provide SARR instruments on USA GPS III GNSS; the first launch ready date is 2023. After the first launch a complete GPS constellation of 24 satellites with SARR instruments should be in place within 10 years.

H:\ICAO-IMO JWG\JWG 22 (2015_Trenton, Canada)\input documents\ICAO-IMO JWG SAR-22.IP.10.doc
16 The following have announced the planned implementation of an operational MEOSAR ground segment (MEOLUT and/or MEOSAR MCC): Algeria, Argentina, Australia, Brazil, Canada, China, the European Commission (Cyprus, France (used for Galileo testing), Norway, Spain), France, Greece, India, Japan, New Zealand, Peru, Russia, Singapore, South Africa, Turkey, UK, UAE and USA.

ACTION REQUESTED OF THE JWG

17 The ICAO/IMO JWG - SAR is invited to note the information provided on the status of the Cospas-Sarsat Programme and take action, as appropriate, particularly to consider possible input from ICAO and/or IMO indicating how long raw data received at earth stations should be kept available for the benefit of accident investigations in order for Cospas-Sarsat to plan for the storage of raw data for such an amount of time as might be needed.

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The IMO Maritime Safety Committee approved Guidance on the Cospas-Sarsat International 406 MHz Beacon Registration Database (IBRD), MSC.1/Circ.1210/Rev.1

GUIDANCE ON THE Cospas-Sarsat INTERNATIONAL 406 MHz BEACON REGISTRATION DATABASE

Need for EPIRB Registration and Associated Databases

1 Emergency position-indicating radio beacons (EPIRBs) perform distress alerting and other functions to support search and rescue (SAR) services covered by the 1979 International Convention on Maritime Search and Rescue, as amended, for any person in distress at sea, and the 1974 International Convention on Safety of Life at Sea (SOLAS), as amended, requires EPIRB carriage (Chapter IV, regulation 7.6) and registration.

2 The provisions relevant to EPIRB registration in Chapter IV, regulation 5-1 apply to all ships on all voyages, and are as follows:

“Each Contracting Government undertakes to ensure that suitable arrangements are made for registering global maritime distress and safety system (GMDSS) identities and for making information on these identities available to rescue co-ordination centres on a 24-hour basis. Where appropriate, international organizations maintaining a registry of these identities shall be notified by the Contracting Government of these assignments.”

3 It is crucial that 406 MHz EPIRBs be registered, and that the registration data be available to SAR authorities at all times. Experience has shown that EPIRB registration data is either critically important or otherwise often helpful in the majority of SAR cases involving an EPIRB alert.

4 406 MHz EPIRBs should be registered regardless of whether they are carried aboard ships or other marine craft, and registrations should be reinforced by national requirements.

5 It is essential that IMO Member States provide a readily-accessible mechanism (preferably one that is available by internet as well as other conventional means) to enable EPIRB owners to fulfill their obligation to register the beacons, and to make this data available for SAR authorities 24-hours-per-day, seven-days-per-week for use in an emergency. Such arrangements can be implemented nationally, on a regional basis in co-operation with other Administrations, or by other suitable means. The Cospas-Sarsat International Beacon Registration Database is a facility available free of charge to enable beacon owners to directly register their beacons and/or to allow Administrations to upload their national registration data to ensure that it is available to SAR authorities worldwide on a 24-hours-per-day, seven-days-per-week basis.

International Beacon Registration Database

6 The International Cospas-Sarsat Programme processes 406 MHz EPIRB alerts and routes them...
to the identified SAR authorities. It also operates the International Beacon Registration Database (IBRD) for 406 MHz beacons, operational since January 2006.

7 The IBRD is hosted on the Internet at www.406registration.com, with online help capabilities.

8 Cospas-Sarsat provides the IBRD as a readily-available means for beacon owners to register their beacons unless an alternative method of registration is required by their national Administration. The registration information contained in the IBRD, whether directly entered by beacon owners or uploaded from national registration databases maintained by Administrations, is available 24-hours-per-day, seven-days-per-week for assisting SAR Services in SAR operations. The IBRD is available free of charge to individuals directly registering beacons and to Administrations uploading or retrieving registration data.

9 Administrations that maintain their own national registers are encouraged to upload their registration data to the IBRD to make their national beacon registration data available as quickly and easily as possible to SAR personnel on a 24-hour basis.

10 The IBRD can be used not only for registering 406 MHz EPIRBs, but also 406 MHz emergency locator transmitters (ELTs) carried on board aircraft, and personal locator beacons (PLBs) designed for personal use.

Background

11 The Cospas-Sarsat 406 MHz System provides distress alerts that include the unique 15-character hexadecimal identification of the transmitting beacon. This beacon identification can be decoded to obtain information that includes:

.1 the type of beacon, i.e. ELT, EPIRB or PLB;
.2 the country code and identification data which form the unique beacon identification; and
.3 the type of auxiliary radio locating (homing) device, e.g., 121.5 MHz transmitter.

12 If a beacon is properly registered, the 15-character hexadecimal identification of the beacon can be used to access additional information. Beacon registration databases can provide information of great use to SAR personnel, including:

.1 specific owner identification information;
.2 the make/model and identification of aircraft or vessel in distress;
.3 communications equipment available;
.4 the total number of persons onboard; and
.5 emergency contact information.

13 To have this valuable information available to SAR authorities in an emergency, it must be available from either a national database available 24-hours-per-day, seven-days-per-week maintained by a national Administration and/or from the IBRD, provided that the national Administration allows direct registration in the IBRD by beacon owners or the Administration uploads its registration data to the IBRD for access by other SAR authorities.
Registration of 406 MHz beacons is required in accordance with international regulations on SAR established by the International Civil Aviation Organization (ICAO) and by the SOLAS Convention. In addition, some countries have made 406 MHz beacon registration mandatory.

**IBRD Concept of Operations**

15 The IBRD is designed to support:

1. beacon owners who wish to directly register their beacons;
2. Administrations to make their registration data easily available to other SAR authorities in an emergency by uploading that information to the IBRD; and
3. SAR authorities that need to efficiently access beacon registration data to assist persons in distress.

16 Cospas-Sarsat has configured the IBRD to accept by default beacon registrations from beacon owners, unless the Administration associated with the beacon’s country code(s) has advised Cospas-Sarsat that it:

1. operates a national database with a 24-hour point of contact and does not want EPIRBs with its country code(s) included in the IBRD; or
2. wishes to control the inclusion of beacons with its country code(s) in the IBRD.

**Establishing an IBRD Point of Contact**

17 Each Administration should provide Cospas-Sarsat with a national IBRD Point of Contact for coordinating use of the IBRD. This Contact will decide the settings in the IBRD related to beacons with its country code and help to resolve problems arising with registration of beacons with that Administration’s country code(s).

18 The national IBRD Point of Contact should be officially identified to the Cospas-Sarsat Secretariat using a letter of the form that may be found at the Cospas-Sarsat website (www.Cospas-Sarsat.int – on the “Cospas-Sarsat Professionals” page choose the “Documents” tab, then “Document Templates, and select the “IBRD” tab). This letter must be signed by the Administration’s IMO representative, or by its representative to Cospas-Sarsat or to the International Civil Aviation Organization (ICAO), and sent to the Cospas-Sarsat Secretariat. Based on the letter, the Cospas-Sarsat Secretariat will allocate the requested user identifications and passwords to the Administration’s national IBRD Point of Contact.

19 The request should specify whether user identification and passwords to be issued to the Administration’s IBRD Point of Contact are required to:

1. enable the Administration to upload registration data about its beacons to the IBRD;
2. enable its SAR Services to access IBRD registration data in an emergency; and/or
3. make IBRD registration data available to authorized shore-based service facilities and vessel inspectors.

20 Passwords and user identifications will be sent via post to the national IBRD Point of Contact.
The national IBRD Point of Contact must then forward the user identifications and passwords to those entities authorized by its Administration to access the IBRD.

21 It is critical that, at a minimum, passwords be requested for SAR Services to access beacon registration information in the IBRD during an emergency.

Providing Details of Your National Beacon Registry

22 If an Administration maintains its own national beacon registry and decides not to allow beacons with its country code(s) to be registered in the IBRD, the Administration should review the information provided on the Cospas-Sarsat website to the public (such as beacon owners) relating to its beacon-registration policies (please see the information contained on www.Cospas-Sarsat.int on the “Cospas-Sarsat Professionals” page choose the “Contact Lists” tab and select “406 MHz Beacon Register”). Please provide the Cospas-Sarsat Secretariat immediately with any updates, as appropriate. This is a source very commonly used by beacon owners to learn where to register their beacons and, therefore, it is critically important that accurate information is provided in order to keep these web pages up to date.

23 Based on the information that Administrations provide, a beacon owners who attempts to register a beacon on the IBRD will be advised through a “pop up” window on the IBRD website of how and/or where to register the beacon (based on the country code programmed into the beacon and the polices of that Administration reported to the Cospas-Sarsat Secretariat).

24 If no information is available regarding a national beacon registry for an Administration, Cospas-Sarsat policy is to assume that no such registry exists and allow the direct registration in the IBRD by owners of beacons with that Administration’s country code(s) (www.406registration.com).

National Administration Control of Beacon Registration in the IBRD

25 If an Administration has elected to prohibit direct registration by owners of their beacons in the IBRD, but wishes to upload to the IBRD some or all of its national beacon registration records, a national IBRD Point of Contact should be designated as described above so that the necessary arrangements can be made to enable the uploading of records.

26 The Administration will be able to upload in bulk its beacon registration data or, if desired, keep sole control of individual record inputs or updates. In that case, beacon owners who attempt to register beacons with that Administration’s country code(s) will be directed by the IBRD website to the Administration’s national website or point of contact for beacon registration.

Means of Registration

27 Beacon registrations allowed on the IBRD only will be accepted via the online facilities of www.406registration.com and, under no circumstances can registrations be accepted in paper format nor by telephone, facsimile or any other communication facilities.

Other Supported Beacon Types

28 In addition to EPIRBs, the IBRD supports two other types of beacons:
.1 Emergency Locator Transmitters (ELTs), for use in aircraft; and

.2 Personal Locator Beacons (PLBs), small beacons for individuals to carry or wear; these beacons sometimes may be used for purposes similar to an EPIRB or ELT, as allowed by local regulations and, therefore, sometimes may be coded to transmit distress messages that have the same content as an EPIRB or ELT, and/or registered as an EPIRB or ELT in the IBRD.

Further Information

29 Further information can be found at www.Cospas-Sarsat.int, or by e-mail at dbadmin@406registration.com