Beacon Manufacturers Workshop (BMW)
September 28, 2018
Palm Beach, Florida

MINUTES

NOTES:

This document covers Workshop highlights.

Complete Workshop presentations and other information are posted on the NOAA SARSAT website (www.sarsat.noaa.gov) under the 'SARSAT Meetings' tab.

1. Opening

The Chair, Mr. Mickey Fitzmaurice (NOAA/SARSAT), welcomed the participants, commented on topics to be covered, and introduced Mr. Mark Turner (NOAA SARSAT Program Manager).

Enclosure (1) lists the Workshop participants and their professional affiliations.

2. Prior Action Items

The Workshop reviewed its prior action items and noted that two had been completed; those that remained open are included in enclosure (2).

3. Cospas-Sarsat

Mr. Dany St-Pierre (Cospas-Sarsat Secretariat) discussed the Cospas-Sarsat (C/S) Program status, ELT(DT) developments and satellite constellations.

While reviewing the official C/S mission, objective and strategy, he emphasized that the Program's services are free worldwide to users in distress.

The Program includes 44 participating States that represent more than 75% of the world population and 85% of the world's wealth; these include four Parties (Canada, France, Russia and the USA), 31 contributors to the System ground segment, and nine user States.

The System uses three types of satellite constellations to support search and rescue (SAR):

- Low Earth orbiting (LEOSAR) with five operational satellites, two planned satellites, and 59 LEOLUTs (ground stations)
- Geostationary orbiting (GEOSAR) with seven operational satellites, five launched and being tested, and three more planned, with 27 GEOLUTs
- Medium Earth orbiting (MEOSAR) (discussed below)

The system uses 30 mission control centers (MCCs) to receive distress alerts from ground stations and distribute them to appropriate global SAR system destinations.

The projected number of MEOSAR satellites was expected to reach 50 by 2021 and 70 by 2030. There are four constellations of MEOSAR satellites:

- Galileo (European Commission (EC)) would have 22 satellites by the end of 2018 with many more planned
- Glonass (Russia) had two experimental satellites with six more planned

- DASS/GPS (USA) had 19 DASS (S-band) operational satellites with eight more planned, and GPS (L-band) satellites planned for launch from 2026
- Beidou (China) had two satellites launched and being tested with four more planned

MEOSAR was expected to become C/S's main system. It would have 16 MEOLUTs by the end of 2018 and 30 more by 2020. It had three LGM MCCs (MCCs that support LEO/GEO/MEOSAR), with 31 more planned. Mr. St-Pierre's presentation included an implementation timeline that showed the MEOSAR system with full operational capability (FOC) by the beginning of 2020. However, MEOSAR was already a major contributor to System effectiveness.

The estimated 406 MHz distress beacon population had reached nearly two million and growing. In 2017, C/S had enabled rescue of 2,554 persons in distress in 934 SAR events worldwide. Over the past five years, C/S had enabled rescue of a growing average of over six persons in distress per day, bringing the total since 1982 to over 46,000. Various types of beacons are dominant in different parts of the world.

C/S was developing a distress tracking emergency locating transmitter (ELT(DT)) that could be triggered in flight aboard an aircraft to help ensure distress alerts are received before a crash and had been demonstrating that this concept and technology would work. ELT(DT)s would typically be triggered by aircraft avionics; initially use available aircraft power; transmit within five seconds of activation and each minute thereafter; provide accurate GNSS and independent locations; and, after activation, operate for up to 370 minutes on their own power. ELT(DT)s would provide accurate four-position aircraft locations via GNSS (primary) and the independent C/S system. ELT(DT)s could potentially be combined with other types of ELTs.

ELT(DT)s would support the autonomous distress tracking (ADT) function of the International Civil Aviation Organization's (ICAO's) Global Aeronautical Distress and Safety System (GADSS), and the alert data would be distributed to aviation authorities and operators via a distress tracking repository (DTR) as well as to the SAR system.

C/S had new specs for first generation beacons (FGBs) and improved second generation beacons (SGBs); these would also comply with the mutually consistent minimum operational performance standards (MOPS) of RTCA (Standard DO-204B) and EUROCAE (ED-62B) which are in final stages of approval. The C/S ground system was being upgraded to be able to process SGB and ELT(DT) signals by ICAO's ADT implementation date in January 2021.

Mr. St-Pierre's presentation, available on the NOAA/SARSAT website, compares the satellite visibility and coverage provided by the three types of satellite constellations, and emphasizes the superiority of MEOSAR. Redundancy of satellite coverage ensures reliable global reception of distress alerts.

Mr. Chris Hoffman (RTCM/ACR) pointed out the superior performance of C/S compared to other technologies used for distress alerting and suggested that this satellite coverage information, which had not been publicly available before, would be valuable to present to ICAO and other forums.

Mr. Tom Pack (ACR/RTCA SC-229 Co-Chair) mentioned that EASA might delay implementation of GADSS ADT until 2023 and wondered how much development of the C/S System and ELT(DT)s could be improved if two more years were available.

4. MEOSAR

Mr. Eric Foster (NOAA/ERT) commented on MEOSAR and preparation for MEOSAR initial operational capability (IOC) from the USA perspective.

The USA:

- Would be using both S-band and L-band satellites in an early operational capability (EOC) phase while working to be ready for IOC before the 33rd session of the C/S Joint Committee convenes in 2019
- Had commissioned MEOLUTs in Argentina, Australia, Canada, Cyprus, France, Japan, New Zealand, Norway, Turkey, Hawaii and Florida, and was testing MEOLUTs for commissioning in Algeria, Brazil, Indonesia, Korea, Russia and UAE
- Had declared its MEOSAR coverage area (95% coverage with an accuracy of 5km); each MEOLUT would be able to track at least six of the average of nine MEOSAR satellites that would be within MEOLUT view at any time; the coverage area would be 100% by 2020
- Was achieving coverage with five LEO/MEOLUTs and four more planned; each MEOLUT would perform well with up to 12 channels and performance would be further enhanced by networking with one or more other MEOLUTs
- Would be installing an additional six-channel MEOLUT in the Southwest U.S. to complement the those in Hawaii and Florida; this would help fill coverage gaps in the South Pacific; this LUT would use a phased-array antenna to track S- and L-band satellites
- Was planning to use additional hybrid LEO/MEOLUTs in Florida, Hawaii, Maryland, Alaska and Guam by early 2019; these would primarily track LEO satellites, but would use channels to track MEO satellites when no LEOs were in view to feed data to MEOLUTs in Hawaii or Florida; channels would be available to track MEO satellites about 50-70% of the time depending on latitude

By January 2020, 48 MEO satellites and 27 MEOLUTs distributed worldwide would be providing 100% global coverage.

C/S was adding LGM MCCs to its system. Besides ones already commissioned in the U.S., France and Norway, 13 others were installed and ready for commissioning tests and 18 more were planned. The U.S. would be commissioning LGM MCCs in Australia, Japan, Canada, Argentina, Brazil, Chile and Peru during 2018 and 2019; other nodal MCCs would be commissioning LGM MCCs within their respective service areas.

Despite the progress toward IOC in 2019, some challenges remained related to: meeting multi-burst accuracy (expected horizontal error (EHE)) requirements; accurately locating slow moving beacons (e.g., floating EPIRBs); filtering suspect alerts; and meeting quality management requirements.

5. Second Generation Beacons

Mr. George Theodorakos (NASA/ASRC) further discussed SGBs, addressing the demonstration and evaluation (D&E), beacon specs, and type approval.

The USA had submitted results to JC-32 on its SGB D&E. The D&E followed the prior technical SGB proof of concept (POC) and had focused on moving operational data through the ground system to the SAR system. The D&E had shown that data would move in a reliable, timely and overall success manner and provide increased location accuracies characteristic of the SGB processing.

The C/S Council had approved the SGB specs (T.018) and preliminary type approval standard (T.021, Issue A). The preliminary type approval standard would be applied and then refined as appropriate based on the initial experiences with SGB type approval tests. However, JC-32 would be considering some final changes to: better align the SGB and FGB documents; potentially make coding changes related to return link service (RLS), self-tests beacon types and a shorter hex ID; and change the activation-cancellation function to account for developments with automatic portable ELTs (ELT (AP)s).

Section 2.5 of T.008, Issue 3, Rev 1 (type approval test facilities) discusses how approved test facilities can become accepted to test ELT(DT)s (under T.001 (FGBs) or T.018) and SGBs. Part of the process is that the test beacon would be tested at the candidate facility and another already approved facility to compare the results.

NASA and CNES (France) had been coordinating development of MATLAB-based software to measure SGB signal characteristics for T.021, B.1-B.8 tests.

Action: NASA to provide to beacon manufacturers, if possible, the MATLAB tools developed by NASA to measure SGB signal characteristics

One of the first SGBs expected to be approved would be an Advanced Next-Generation Emergency Locator (ANGEL) personal locator beacon (PLB) that the NASA Orion Crew would be using as its survival beacon. EPG was testing a couple of ANGEL beacons with monopole antennas.

The Army Electronic Proving Grounds (EPG) lab was preparing to be an accepted U.S. lab for C/S beacon type approvals. EPG had been performing antenna pattern measurements using a large outdoor test arc site. It had tested a monopole antenna for various ground plane configurations; these results would become reference measurements for future tests of other monopole antennas. EPG was acquiring an elevation positioner that would enable measuring EIRP up to 90^{o} elevation. No tests had been done so far for patch antennas.

Mr. Theodorakos showed a table (see presentation on the NOAA/SARSAT website) of T.021 tests for encoded position data. The table indicates how the tests can be done, and whether a test would be conducted by the lab or the beacon manufacturer.

The Chair commented that type approval processes must work well without being too costly.

Mr. Hoffman stated that GNSS tests for SGBs were more complex than for FGBs. He wondered whether the required measure-of-uncertain test was achievable. He also wondered whether tests at various power levels might validate that required power could be reduced. Mr. Theodorakos replied that power and accuracy are related; accuracies down to 200 meters were achievable, but the required 100-meter accuracy would likely depend on power being higher.

Mr. Hoffman asked about progress on locating moving beacons. Mr. Theodorakos said that the U.S. had been struggling to produce good locations for moving FGBs, but he expected results for SGBs to be much better. French results with SGBs had been good.

6. Homing and Intelligent Transmit Scheduling (HITS)

Mr. Ed Thiedeman (USCG) and Mr. Hoffman were co-chairs of a C/S HITS correspondence working group (CWG). Mr. Thiedeman said that part of the CWG's tasking was to define homing and locating solutions for FGBs and SGBs, and to work on enabling SAR facilities to home on the FGB 406 MHz satellite signal.

Mr. Thiedeman identified and discussed issues from JC-31 relevant to HITS; work on these continued:

- A potential conflict existed between Article 32 and Appendix 15 of the ITU International Radio Regulations about whether the satellite signal could be used for homing. The CWG was working with an IMO-ITU Experts Group and ITU Working Party 5B on maritime mobile services (WP-5B) to resolve the matter
- The CWG was to analyze advantages and disadvantages of homing on 406 MHz signals
- The USA and RTCM were seeking clarification from JC-32 on C/S's requirements for homing documented in C/S G.008 (operational requirements for SGBs)
- The CWG was reviewing concepts for homing equipment that could detect, locate and decode SGB signals (spread spectrum/wideband)
- Trials were being conducted to evaluate homing on reduced duty cycle (33%, 50% and 66%) 121.5 MHz signals. The USA, Canada, Norway, Australia and the UK had contributed to this work with tests that generally found no significant degradation compared to homing on continuous signals. The International Maritime Organization (IMO) would be considering results of these tests in completing its EPIRB performance standard; IMO intended to provide for automatic identification system (AIS) homing

The USCG homes on 406 MHz and then switches to 121.5 MHz as it approaches the beacon; however, SGB signals are harder to detect. An objective is to maintain effectiveness of beacons for SAR with SGBs. SGBs can be detected, located and decoded with direction finding equipment, but the equipment is relatively expensive.

RTCM had submitted a paper to JC-32 (JC-32/8/14) on SINSIN, a patented technology to improve homing and MEOLUT performance. The use, constraints and costs associated with the patent were unclear. The paper was intended to check on the JC's interest.

7. IMO and ICAO

Mr. Thiedeman commented on relevant developments with IMO and ICAO. IMO is responsible for the Global Maritime Distress and Safety System (GMDSS) and ICAO for the Global Aeronautical Distress and Safety System (GADSS).

IMO had adopted changes to its Safety of Life at Sea Convention (SOLAS) to modernize GMDSS. Likely outcomes would include acceptance of satellite communication service providers (CSPs) in addition to Inmarsat and C/S, updates to the EPIRB performance standard, and consequential changes to IMO, IEC and ITU documents.

The IMO/ITU Experts Group had drafted some housekeeping and clarification changes to SOLAS and had recommended retaining five-year EPIRB maintenance intervals. For the IMO EPIRB standard, it proposed requiring GNSS receivers with an indication of GNSS reception, and a provision for transmitting the beacon ID in the AIS message so the 406 MHz signal and

AIS message could be linked to the same beacon (consistent with RTCM 11000.4). IMO was expected to process these changes and approve them at its Maritime Safety Committee meeting in June 2019.

Mr. Thiedeman reviewed the SAR-related objectives of ICAO's GADSS, which are like those of the IMO GMDSS. However, they include tracking an aircraft in distress while it is still in flight and helping to locate flight data recorders. Annex 6 (Operation of Aircraft) of the ICAO Convention provides for aircraft tracking. The ICAO GADSS CONOPS provides for autonomous distress tracking (ADT) of flying aircraft in distress at one-minute intervals, post-flight localization and recovery, and dissemination of GADSS information.

GADSS aircraft tracking (AT) would support SAR by identifying and locating aircraft, ensuring availability of aircraft position data, and efficiently alerting air traffic services (ATS). Tracking would provide non-distress 4D position data (lat-long, altitude and time) at intervals of 15 minutes or less.

ADT would help locate an aircraft in a distress situation pre- and post-crash with ELT(DT)s (potentially) and ELTs. ICAO was also considering other ADT technical solutions. GADSS includes provisions for locating crashed aircraft within one mile and for homing on the site.

GADSS would have a distress tracking repository (DTR) (concept under development) to hold data on aircraft in actual or potential distress. The DTR would be accessed via system-wide information management (SWIM), global technology used to facilitate access to and sharing of operational air traffic data.

To date, ICAO had published a GADSS CONOPS (June 2017) and was developing a white paper on DTRs. EUROCAE, RTCA, and C/S standards had provided for ELT(DT)s for ADT.

8. RTCA SC-229

Mr. Tom Pack discussed the work of the Radio Technical Commission on Aeronautics (RTCA) on development of minimum operational performance standards (MOPS) for 406 MHz emergency locator transmitters (ELTs). This work had been carried out jointly under RTCA's Special Committee 229 (SC-229) and EUROCAE's Working Group 98 (WG-98); RTCA would publish the MOPS as document DO-204B and EUROCAE would publish it as ED-62B. This Joint Committee had met in plenary 16 times since March 2014 to finish its work.

The Committee had established five working groups:

- WG-1 (Triggered Flight) helped to develop a list of criteria for triggering in-flight distress alerting, including unusual altitude, unusual speed, excessive accelerations, ground proximity, etc. The criteria had associated limits, persistence times, cancellations and test procedures. The aircraft avionics would activate an inflight distress alerting capability, such as an ELT(DT), which would then transmit information to distribute to Cospas-Sarsat, the aircraft operators (on the ground), and ATS
- WG-2 (Crash Safety) worked on matters that would improve the reliable operation of an ELT involved in a crash
- WG-3 (SGB Homing) was involved in homing trials and transmission scheduling
- WG-4 (GNSS, Power, RLS, Etc.) coordinated committee work with other RTCM and EUROCAE bodies on matters like GPS and lithium batteries

- WG-5 (Standards) worked on harmonizing DO-204B and ED-62B and on structuring and writing the MOPS

The Committee and C/S had to closely coordinate their work because SGBs had to work through the C/S System, and the MOPS and C/S T.018 had to be consistent for SGBs and ELT(DT)s. Work on the MOPS also had to be harmonized with GADSS and C/S system development timelines, which were quite aggressive. Other RTCA Committees had to update MOPS for lithium batteries (DO-227A) before the ELT MOPS could be completed. One concern for lithium batteries is thermal run-away.

The Committee finished its work in August and sent the MOPS to RTCA and EUROCAE for approval, which was expected by the end of 2018.

EUROCAE had completed a minimum aviation system performance specification (MASPS) on criteria to detect in-flight aircraft distress events to trigger transmission of flight information (DO-237) and submitted it to ICAO for inclusion in Annex 6. This would be referenced by the ARINC Airlines Electronics Engineering Committee (AEEC) as it develops industry standards for aircraft interfaces for ADT installations. In due course, the FAA and EUROCAE would adopt the MOPS into technical standard orders TSO-c126C and ETSO-c126B, respectively.

9. RTCM

The Radio Technical Commission for Maritime Services (RTCM) had a new President, Mr. Ed Wendlandt, USCG retired.

Mr. Hoffman explained that the primary role of RTCM Special Committee 110 (SC-110) is to develop and maintain standards for 406 MHz EPIRBs and PLBs, and for 406 MHz Ship Security Alert Systems (SSAS). SC-110 is also involved in:

- Considering new technology, ideas and other related matters of interest to its members e.g. AIS EPIRB, C/S MEOSAR system
- Supporting C/S, particularly the C/S JC meetings
- Developing input for SGB specs for MEOSAR
- Preparing EPIRB and PLB AIS standards

While RTCM's main role is developing standards, it also participates in numerous national and international committees, disseminates information to its members, and advises on legislation and regulation changes. RTCM had submitted 11 papers to JC-32 and co-sponsored six others.

RTCM's EPIRB standard is based on IEC's standard with additions that address:

- Mandatory internal nav interface
- Internal nav device timing
- GNSS self-test
- Inadvertent activation
- Incorrect mounting
- Ergonomics requirements and tests
- Cold thermal shock tests
- Option for AIS homing

So far, the EPIRB standard does not address SGBs. Also, it will have to be updated once IMO updates its EPIRB performance standard.

The newly published RTCM PLB Standard (M.11010.3) provides for:

- FGBs and SGBs
- Category 1 PLBs (must float) and Category 2 PLBs (not required to float)
- Three PLB classes based on operating temperature ranges
- Three PLB groups (Group 1 with 121.5 MHz homing; Group 2 reserved; and Group 3 with 121.5 MHs plus AIS homing)

Generally, as sensible, any combination of generation, category, class, and group of PLB is permitted.

PLB functionality includes the following:

- PLBs must have a GNSS receiver with positions updated at least every five minutes
- RLS is optional
- The 121.5 MHz homing duty cycle is 33% (not less than 0.75 seconds on and then off for not more than 1.5 seconds); higher duty cycles have increase on time and decrease off time
- The AIS locating signal is based on the AIS search and rescue transponder (SART) spec

Mr. Hoffman commented on a RTCM petition to the FCC in August to adopt M11010.3 by reference into 47 CFR 95.2989. This had prompted an FCC public notice to comment on RTCM's proposal. The FCC received four supporting comments in September and would reach a decision on what to do next. Meanwhile, the FCC could grant individual waivers for approval of M.11010.3 PLBs, including for PLBs that use AIS.

10. Beacon Issues and Registration

Mr. Apurve Mathur (NOAA/ERT) commented on beacon issues and registration of beacons in the NOAA/SARSAT registration database (RGDB).

Mr. Mathur asked that manufacturers and others, refer potential government purchasers of beacons to NOAA. The buyer would be educated about important matters such as distribution of distress alerts, beacon testing and operation, false alerts and beacon maintenance and possible special coding and processing of alerts different than the normal processing, if deemed necessary for the respective Government program (agency).

The OMB-approved beacon registration form provides a place for a five-digit checksum used by the RGDB to verify beacon hex IDs. NOAA contacts owners by email or via snail mail when the checksum validation fails to advise them of a possible mismatch between the beacon ID and the checksum value. RTCM standards are expected to be changed to require checksums. Some manufacturers were not voluntarily providing a checksum so far; NOAA asked that they be provided on decals for the beacon and registration form. This will be an added value to check for a correct ID for when beacons are transferred to a new owner.

Mr. Mathur identified ways beacon manufacturers and service centers could help improve the RGDB:

- Download the latest registration form (dated December 2017) from NOAA to provide to beacon owners
- Make NOAA aware right away of known issues that could impact owners, such as duplicate beacon IDs, mislabeling or recalls

- Provide legible UIN labels on blank registration forms
- When an ELT's UIN is reprogrammed, provide a registration form to the owner with the new UIN on it and advise the owner in writing to register the beacon
- Use a font such as Consolas that clearly differentiates zeros from the letter *O* and eights from the letter *B*
- Use bar codes on the beacon labels and registration forms (bar codes can be useful in situations when the UIN might not be readable, but the bar code can be scanned)
- Verify the NOAA decal during beacon servicing to ensure beacon is registered, check the registration expiration date, and remind owners to renew registrations
- If replacing a beacon, caution the owner to register the beacon as a replacement

Regarding the RGDB, Mr. Mathur noted that:

- Owners of multiple beacons can link registrations under one user name
- Challenge questions enable quick and secure access
- The RGDB checks for errors real-time
- A one-click provision lets owners advise about disposition of a beacon he or she no longer uses
- The RGDB archives scan registrations for improved processing and quality control of registrations sent to NOAA by email, fax, mail
- The RGDB *pending registration* process for transferring ownership had been improved

Mr. Mathur's presentation included remarks on RGDB statistics and registrations that included, inter alia:

- Total registrations (by beacon type), new registrations (by beacon type) and means of registration
- Statistics showing a bump in Florida EPIRB and PLB registrations consequential to a State law effective July 2016 reducing vessel registration fees for EPIRB and PLB owners
- Monthly statistics available on the NOAA/SARSAT website

The RGDB contains about 600k registrations, with about 44k new ones being added annually. By next year the number of registered PLBs was expected to outnumber those for EPIRBs. Beacon attrition in the U.S. seemed to be longer than ten years on average based on registration expiration data and beacon activations. About 20% of registrations were still completed on paper rather than on the website.

NOAA contacts owners every two years about currency of their registration data; most registration updates are triggered by these reminders.

LCDR Erin Boyles (USCG) emphasized the importance to SAR personnel of the points Mr. Mathur had made, because registration issues are a routine problem for them. The Chair

added an emphasis about the value of using checksums and the value of the checksum being passed to a new owner if a beacon is sold.

Mr. Pack suggested developing a process to monitor self-test messages, which Mr. Mathur indicated NOAA had considered

Mr. Steve Lett (C/S Secretariat) suggested finding more value-added uses for bar codes and to consider use of QR codes. These were among the topics the Secretariat was considering during plans to enhance the International Beacon Registration Database (IBRD). *Mr. Lett invited any recommendations for improving the IBRD and need to have them by December 1st.*

Mr. Hoffman advised that mandatory use of checksums entails, for some manufacturers, updating software for many dealers. Mr. Mathur indicated that attempts to gradually update software for dealers would eventually enable all to generate checksums for beacons and registration forms when applicable.

11. Beacon Type Approval

Mr. Eric Harpell (C/S Secretariat) highlighted beacon type approval developments that had occurred since the 2017 Beacon Manufacturer Workshop; the changes mostly apply to FGBs.

> *[Note: Please review Mr. Harpell's PowerPoint presentation posted on the NOAA website for details of changes to C/S T.001 and other documents; the changes are too numerous to address in the minutes of this meeting.]*

The C/S Council had adopted T.001 (FGB specs) and T.007, Issue 5, Draft Revision 2 (type approvals) with many detailed changes that would be important to beacon manufacturers. The Council had also decided that a partial re-certification would be required for existing accepted test facilities wishing to perform type approval testing for T.001 compliant ELT(DT)s and/or SGBs.

The Secretariat had been instructed to post on its website not only the approved versions, but also versions that show all the changes. The final and mark-up versions can be found under the *professionals* tab and then the *documents* tab on the www.Cospas-Sarsat.int site.

Mr. Lett announced that www.406.org was available as an optional link for accessing the Cospas-Sarsat website.

Mr. Harpell called attention to C/S basecamps that provide globally accessible space to make proposed document changes that can be considered by C/S.

12. False Alerts and SARSAT Outreach

LT Aaron Colohan (NOAA) discussed some aspects of the U.S. SARSAT outreach to address public issues. Some success in reducing false alerts over the years had been offset by the increased effectiveness of MEOSAR to detect alerts that might have been missed in the past.

LT Colohan emphasized the risks and costs associated with SAR operations, and the needless risks associated with responding to false alerts. Such responses also rob resources needed to respond to persons in distress. SAR forces cannot ignore an alert unless it is confirmed to not involve a distress situation.

In 2017, ELTs accounted for 55% of the false alerts and 18% of the registered beacons; EPIRBs caused 37% of the false alerts and comprise 42% of registered beacons; PLB contribution was 8% of the false alerts and involve 40% of the registered beacons.

More than 98% of ELT alerts processed by the USMCC are false; in 2017, 121 ELT activations involved persons in distress. 94% of false alerts from ELTs were due to mishandling. The EPIRB statistics are similar, and the main cause was the same. The total number of false alerts processed in 2017 was 16,971, and the numbers grow every year.

With mishandling being the prevalent false alert cause, education must be a prevalent part of the solution. However, based on discussions with aircraft operators, aircraft mechanics, aircraft owner associations, and ELT manufacturers, the main cause of ELT false alerts is, more specifically, testing. ELTs are apparently activated in the *operational* mode since they have no *self-test* mode. Test personnel seem to follow incorrect procedures out of ignorance or lack of proper guidance.

In May 2018, NOAA had formed an Aviation Team of Experts (ATE) comprised of reps from NOAA, NASA, USCG, USAF, FAA, Astronics, AOPA, CAP and many others to use education to help reduce false alerts and improve beacon registration. The ATE goal was to reduce false alerts by 10-20% over the next 12 months.

LT Colohan urged anyone who could to use conversations, posters, videos, written instructions, etc. to provide accurate, consistent and prevalent information and instructions to help address false alerts.

LT Colohan mentioned some of the events that NOAA and others attend to promote widespread and responsible use of beacons.

Mr. Hoffman mentioned that: C/S would soon have a new video on false alerts available for all to use; airline instructions on ELT testing are mostly wrong; and ELT testing is complicated by lack of self-test switches. He also suggested using registration data to follow up on any PLB false alert, since such alerts would almost solely result from a manual beacon activation.

Mr. John Fisher (FAA) stated plans to publish a new aviation advisory circular to address common concerns about ELTs, including purchasing, proper installations, disposal, maintenance and many other ELT life cycle topics. *He urged anyone with suggestions for content of the circular to contact him not later than December 31st, and noted that once the document is finished it would likely be released for public comment for 30 days, probably about the same time that the new TSO for ELTs is released for comment.* He acknowledged that FAA regs and circulars were out of date. Mr. Fisher advised that he was also collecting a library of as many documents as possible related to ELTs, which he would like to make available to the public as practicable.

Mr. St-Pierre recommended that NOAA track and deal with repeat false alert offenders (owners, maintainers, hex IDs, etc.).

Mr. Mathur mentioned that NOAA would continue discussing reduction of false alerts.

LCDR Boyles stressed that SAR personnel want people to know how to properly dispose of beacons. They refer people to NOAA on this and NOAA refers them to beacon manufacturer instructions. L*CDR Boyles asked that manufacturers be sure to address beacon disposal in their instructions.*

13. Cospas-Sarsat Beacon Manufacturers Survey

Mr. Andryey Zhitenev (C/S Secretariat) discussed preliminary results of the 2018 survey of beacon manufacturers. 45 manufacturers had participated from Europe, the U.S. and Canada, and Asia and Australia. Five of the manufacturers planned to begin producing beacons, and 42% had increased production in 2017; 26 manufacturers had produced more than 500 beacons that year, and three had produced none.

About 218,000 beacons were produced in 2017; production of EPIRBs and ELTs increased modestly, while ELT production went up 22%. About 27,000 ELTs were produced, with the remaining number about equally divided between EPIRBs and PLBs.

The global beacon population grew 5% in 2017 to about 1,879,000.

The weighted life cycle of ELTs was about 16 years; for EPIRBs and PLBs it was less than ten.

About 65% of beacons produced in 2017 used location protocols, but only about 8% of location protocol beacons were ELTs; most were PLBs.

Manufacturers collectively projected production of about 218,000 beacons in 2018, with the ratios among beacon types staying unchanged.

The Secretariat had handled 148 type-approval applications in 2017.

14. Review of Action Items

Enclosure (2) is a list of action items that remain open from this and prior BMW meetings.

15. Closing Remarks

The Chair, Mr. Turner, and Mr. Lett thanked GME for its special support for the meeting, RTCM for hosting the Workshop, SARSAT partner agencies and other federal agencies that had supported the meeting, ERT staff for their logistics and admin support, the Chair, and especially all the Workshop participants.

The date and venue of the next Workshop had not been determined.

The Chair adjourned the meeting.

Enclosures:

1. List of Participants
2. List of Open Action Items

Enclosure (1)

List of Participants

Beacon Manufacturers Workshop
September 28, 2018
Palm Beach Gardens, FL

	NAME	ORGANIZATION
1	Anderson, Kelly	American Radio Association
2	Avidor, Dalia	Astronics DME
3	Bastiani, Sergio	Astronics DME
4	Beljic, Zeljko	GME
5	Boyle, LCDR Erin	USCG
6	Caporale, Chris	NOAA/ERT
7	Colohan, LT Aaron	NOAA
8	Eggen, Øyvind	Jotron AS
9	Fisher, John	FAA
10	Fitzmaurice, Mickey	NOAA
11	Foster, Eric	NOAA/ERT
12	Fuechsel, Jack	GMDSS Task Force
13	Fuhrmann, Dave	Air Force Rescue Coordination Center
14	Gonzalez, Pablo	Astronics DME
15	Greenway, Deborah	Rakon
16	Griffin, Sean	GME
17	Harpell, Eric	Cospas-Sarsat Secretariat
18	Hessler, Lisa	NOAA/ERT
19	Hiner, Eric	Astronics DME
20	Hoffman, Christopher	ACR Electronics, Inc.
21	Igarashi, Kiyoshi	ARIB
22	Jackson, Martin	USCG
23	Jobey, Laurent	Syrlinks
24	Khalek, Ghassan	FCC
25	Khorrami, Jeff	Orolia/McMurdo
26	Kumagai, Yukihiko	ARIB
27	Landa, Joseph	BriarTek, Inc.
28	Lariviere, George	Whiffletree Corporation

29	Lavoie, Alexandre	Transport Canada
30	Lemon, Dan	NOAA/ERT
31	Mathur, Apurve	NOAA/ERT
32	McCurry, Chris	Dukane Seacom
33	Nolan, Simon	Ocean Signal Limited
34	Pack, Thomas	ACR Electronics, Inc.
35	Rich, Alex	BriarTek, Inc.
36	Smith, Sharon	NOAA/ERT
37	Soglo, Per	Jotron AS
38	Stankovic, Dan	ACR Electronics, Inc.
39	St-Pierre, Dany	Cospas-Sarsat Secretariat
40	Takahashi, Masaaki	Icom America, Inc.
41	Takita, Junji	Suiyokai, Marine Radio Engineering Association of Japan
42	Taylor, Stuart	Techtest Ltd
43	Taylor, Yvonne	NOAA/ERT
44	Theodorakos, George	NASA
45	Thiedeman, Edwin	USCG
46	Turner, Mark	NOAA
47	Wahl, Hauk	Jotron USA, Inc.
48	Yarbrough, Larry	Retired
49	Zhitenev, Andryey	Cospas-Sarsat Secretariat

Enclosure (2)

SARSAT Beacon Manufacturer's Workshop
Open Action Items from 2018 and Prior Meetings

Action Item #	Description	Status
BMW-2015-AI.3	USA SARSAT Program to review with the FAA whether its guidance for testing beacons could be improved to reduce false alerts occurring during maintenance	*Open.* *NOAA Corps SARSAT officer had been liaising with the FAA and would continue this work to provide clarification of ELT testing procedures* *Beacon and antenna testing are not always done correctly. The FAA guidance should be updated. RTCA SC-229 had been reviewing antenna testing.*
BMW-2017-AI.1	NASA to distribute to BMW attendees the MEOSAR D&E Phase II T1 test data	*Open*
BMW-2017-AI.2	NOAA to post on the NOAA/SARSAT website any available performance data for various elevation angles for monopole antennas	*Open*
BMW-2018-AI.1	NASA to provide to beacon manufacturers, if possible, the MATLAB tools developed by NASA to measure SGB signal characteristics	*Open*