International Civil Aviation Organization

WORKING PAPER

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ASSEMBLY — 37TH SESSION

TECHNICAL COMMISSION

Agenda Item 46: Other issues to be considered by the Technical Commission

ALTERNATIVE MEANS OF REPORTING THE POSITION OF AIRCRAFT IN DISTRESS

(Presented by the Russian Federation)

EXECUTIVE SUMMARY

At present, the Standards of Annex 6 to the Convention on International Civil Aviation in force require that all aircraft for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with COSPAS-SARSAT system automatic emergency locator transmitters.

Given the development of alternative technologies which make it possible to determine the position of aircraft in distress, it seems possible, following the completion of relevant studies, to authorize the application in civil aviation of such alternative technologies for general aviation.

Action: The Assembly is invited to request the Council to study the possibility of using alternative means of reporting the position of aircraft in distress instead of automatic ELTs for general aviation and, if expedient, to propose the development of an appropriate amendment to Annex 6 – *Operation of Aircraft* – to the Convention on International Civil Aviation.

Strategic Objectives:	This working paper relates to Strategic Objective A.
Financial implications:	The financial resources required to fulfil this task are provided in the proposed draft Regular Programme Budget within the framework of the funding for the implementation of the recommendations of the High Level Safety Conference (HLSC).
References:	Annex 6 — *Operation of Aircraft* Doc 9935, *Report of the High-level Safety Conference (2010)*, Recommendation 3/2 COSPAS-SARSAT Report on System Status and Operations No. 25, C/S R.007, Annex C

[1] Russian version provided by the Russian Federation.

1. BACKGROUND AND STATUS OF COSPAS-SARSAT TECHNOLOGY

1.1 The COSPAS-SARSAT system was created by an agreement between the Russian Federation, the United States, France and Canada in 1979. The system was prepared for operational readiness in 1982. The system consists of six low earth-orbiting satellites located on a near-polar orbit, five geostationary satellites, a ground-based communications station, a control centre and coordinating rescue centres.

1.2 The first generation beacons which used a frequency of 121.5/243 MHz had a high level of false responses and faults. Given these limitations, ICAO and the International Maritime Organization (IMO) recommended that the COSPAS-SARSAT Council switch to a frequency of 406 MHz. In October 2000 the COSPAS-SARSAT Council announced that it was stopping processing signals at frequencies of 121.5/243 MHz from 1 February 2009. The new generation beacons use a digital signal of 406 Mhz and transmit a unique owner code which allows for attempts to be made to communicate with the owner before launching a search operation.

1.3 The current standards of Annex 6 — *Operation of Aircraft* require the installation of automatic-activating beacons on all aircraft with individual airworthiness certificates issued after 1 July 2008.

1.4 The existing technology has a number of well-known limitations connected, above all, with the need for manual or automatic activation. The reasons for technological faults include the disconnection of the antenna cable during an aviation accident and the destruction of the beacon. Moreover, fragments of an aircraft may sink or be transformed after a disaster. The activation time for the beacon is made up of minute units which could be a significant factor in a fast-evolving situation in the course of an air accident.

1.5 Although the distress signal can be detected by the geostationary satellites almost instantly, in northern and polar regions the geostationary satellites are low on the horizon which leads to a high probability of signals being blocked by the landscape or vegetation which can result in significant delays in detecting the signal using low earth-orbiting satellites.

1.6 The number of false responses remains high. On account of the stronger signal in the new generation beacons, responses are often detected in locations during storage, even before the beacon is installed on the aircraft and is registered.

1.7 With regard to the proportion of working automatic responses of the emergency air radio beacons, in the Russian Federation in 2009, 460 reports were received, of which only three were for actual air accidents, and the radio beacons were switched on manually by the crew or rescue workers – in no case did the beacons work automatically.

1.8 It is worth noting that COSPAS-SARSAT beacons malfunction in serious air accidents, as with the AF447 incident.

1.9 This points to the need for further improvements to technology for locating crashed aircraft.

2. AN OVERVIEW OF ALTERNATIVE TECHNOLOGY

2.1 Personal location beacons (PLB)

2.1.1 The new generation COSPAS-SARSAT beacons (406 MHz) are activated manually. All of today's models have an in-built GPS receiver and transmit their own coordinates which allows them to be located quickly with the help of geostationary satellites. The cost of PLB is much less than the cost of an automatic beacon and its installation in an aircraft. PLB are easily transferred from one aircraft to another, leading to further cost savings.

2.2 Location reporting equipment which uses cellular networks

2.2.1 The improving coverage by cellular networks and the distribution of location reporting equipment using cellular networks makes it possible to use cheaper devices. Information can be transferred on a centralized server via SMS (short messages) or via the GSM (GPRS) communication channel. When entering an area with no cellular network coverage, the tracker can accumulate information and send it when this becomes possible again. These are widely used in motor vehicles.

2.3 Commercial emergency notification and location devices (CENALD)

2.3.1 These use one of the commercial satellite groups as a transfer channel. The device uses an in-built global navigation satellite system (GNSS) receiver to determine its location. One of its typical functions includes periodic location notifications sent to a central server.

2.3.2 The main benefit of similar devices (both satellite devices and those using cellular networks) is the fact that the device should work before the accident and not necessarily afterwards.

2.4 CNS/ATM systems

2.4.1 Aviation notifications have undergone significant progress in terms of creating and operating CNS/ATM systems. In many parts of the world, the operation of GNSS is allowed in order to determine the exact location of aircraft. There has been a lot of development in terms of automatic dependent surveillance — contract (ADS-C) and automatic dependent surveillance — broadcast (ADS-B) systems, giving land-based staff accurate information about the aircraft coordinates which are sent along "air-ground" data transfer lines.

3. CONCLUSIONS

3.1 The COSPAS-SARSAT program has proved effective for marine applications, as well as in applications where manual or automatic activation of the beacon is possible.

3.2 Practice has shown the need for further improvements to the technology used for search and rescue operations.

3.3 It is proposed that countries support entrusting the ICAO Council with studying the possible use of resources for the continued surveillance of the location of aircraft and develop minimum operational requirements for these systems in addition to COSPAS-SARSAT manual beacons.

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