European Aviation Safety Agency

Explanatory Note to Decision 2017/023/R

Acceptable means of compliance and guidance material to implementing rules related to flight recorders, underwater locating devices and aircraft tracking systems

(third set)

RELATED NPA/CRD 2013-26 — OPINION NO 01/2014 — RMT.0401

EXECUTIVE SUMMARY

This document contains explanations on newly developed acceptable means of compliance (AMC) and guidance material (GM), which are intended to complement the implementing rules (IRs) on aircraft tracking and underwater locating devices (ULDs).

The AMC and GM are related to the following topics:

— Minimum performance objectives and guidance for an aircraft tracking system; and

— Requirement to install a ULD on board an aeroplane performing long-range over-water flight.

Action area:	Aircraft tracking, rescue operation and incident/accident investigations		
Affected rules:	Decision 2012/015/R (GM to Definitions); Decision 2014/015/R (AMC/GM to Part-CAT)		
Affected stakeholders:	Aircraft operators; aircraft manufacturers; flight crew members; safety investigation authorities; national aviation authorities		
Driver:	Safety	**Rulemaking group:**	No
Impact assessment:	Light	**Rulemaking Procedure:**	Direct

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1. About this Decision

The European Aviation Safety Agency (EASA) developed this regulatory proposal in line with Regulation (EC) No 216/2008[1] (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure[2]. This rulemaking activity is included in the EASA 5-year Rulemaking Programme[3] under rulemaking task (RMT).0401.

EASA issued on 5 May 2014 Opinion No 01/2014[4] titled 'Amendment of requirements for flight recorders and underwater locating devices'.

Said Opinion and the associated CRD 2013-26[5] contained draft IRs and draft AMC/GM to address the following safety issues:

(a) unreliability of obsolete recording technologies such as magnetic tape, magnetic wire and frequency modulation;

(b) frequent cases of cockpit voice recorder (CVR) overwriting the recordings after an accident or a serious incident;

(c) insufficient transmission time of the ULDs fitted to flight recorders; and

(d) insufficient detection range of the ULDs fitted to flight recorders after an accident over an oceanic area.

The committee established by Article 65 of the Basic Regulation (hereinafter referred to as the 'EASA Committee'), composed of experts of the European Commission and EU Member States, drafted a regulation based on the EASA proposals, but also including IRs to address issues not covered through Opinion No 01/2014. In particular, aircraft tracking (Part-CAT, CAT.GEN.MPA.205), location of an aircraft in distress (Part-CAT, CAT.GEN.MPA.210), as well as use and protection of CVR recordings (Part-CAT, point CAT.GEN.MPA.195(f)). Said Regulation was published on 16 December 2015 as Commission Regulation (EU) 2015/2338[6].

New AMC and GM, in addition to those presented in CRD 2013-26, had to be developed to complement the IRs introduced by the EASA Committee following the publication of the Opinion. EASA organised a consultation on those draft AMC and GM from 25 September 2015 until 16 October 2015. In order to save time, in particular because the amended point CAT.GEN.MPA.195(f) was immediately applicable, this consultation was limited to the EASA Advisory Bodies, namely the Rulemaking Advisory

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1 Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1) (http://eur-lex.europa.eu/legal-content/EN/TXT/?qid= 1467719701894&uri=CELEX:32008R0216).

2 EASA is bound to follow a structured rulemaking process as required by Article 52(1) of Regulation (EC) No 216/2008. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure).

3 http://easa.europa.eu/rulemaking/annual-programme-and-planning.php

4 http://easa.europa.eu/document-library/opinions/opinion-012014

5 http://easa.europa.eu/system/files/dfu/CRD%202013-26.pdf

6 Commission Regulation (EU) 2015/2338 of 11 December 2015 amending Regulation (EU) No 965/2012 as regards requirements for flight recorders, underwater locating devices and aircraft tracking systems (OJ L 330, 16.12.2015, p. 1) (http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1499244822838&uri=CELEX:32015R2338).

Group (RAG), the Thematic Advisory Groups (TAGs), and the Safety Standards Consultative Committee (SSCC).

In view of the feedback provided during the first consultation, it was decided to amend the draft AMC and GM and organise a second round of consultation of RAG, TAG and SSCC from 28 January 2016 to 25 February 2016. The scope of this second round of consultation was restricted to AMC and GM related to points CAT.GEN.MPA.205 and CAT.GEN.MPA.195(f), excluding AMC and GM to CAT.GEN.MPA.210[7].

At the second round of consultation, some stakeholders expressed concern about the risk of misalignment with ICAO on the topic of aircraft tracking. Indeed, although a first set of SARPs was adopted by the ICAO Council in December 2015, the need for an additional Standard addressing flexibility provisions and for guidance were also identified by ICAO. For this reason, it was decided to issue the AMC and GM related to point CAT.GEN.MPA.195(f) (adopted with Decision 2016/012/R[8]) and to postpone the issuance of AMC and GM for CAT.GEN.MPA.205 until ICAO would have completed the planned work.

The remaining ICAO standard on aircraft tracking was adopted by the ICAO Council in February 2017 and it will be published with Amendment 42 of ICAO Annex 6 Part I. In addition, ICAO published in April 2017 a circular on aircraft tracking implementation[9], which was the last of their announced deliverables on aircraft tracking. Following this publication, it was decided to resume the preparation of AMC and GM for CAT.GEN.MPA.205.

A third consultation of the Advisory Bodies on draft AMC and GM on aircraft tracking was therefore organised from 3 August to 7 September 2017.

The comments received during the third consultation and EASA's responses thereto are presented in Appendix 1 - CRD to comments received during AB consultation.

The final text of this Decision with the acceptable means of compliance (AMC)/guidance material (GM) has been developed by EASA.

The major milestones of this rulemaking activity are presented on the title page.

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7 Indeed, it was recognised that International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs) and guidance for location of an aircraft in distress was missing, as well as industry standards and that the adoption of AMC and GM could be delayed given that CAT.GEN.MPA.210 is only applicable to aeroplanes first issued with an individual CofA on or after 1 January 2021. Therefore, it was decided after the first consultation to put on hold the preparation of AMC and GM to CAT.GEN.MPA.210.

8 ED Decision 2016/012/R of 12 September 2016 amending Acceptable Means of Compliance and Guidance Material to Part-CAT, Part-NCC and Part-SPO of Commission Regulation (EU) No 965/2012:
'AMC and GM to Part-CAT — Issue 2, Amendment 7;
AMC and GM to Part-NCC — Amendment 6; and
AMC and GM to Part-SPO — Amendment 6'
(AMC and GM to implementing rules on flight recorders, underwater locating devices and aircraft tracking systems (second set)).

9 Circular 347, Aircraft Tracking Implementation Guidelines, Implementation Guidance for Operators and Civil Aviation Authorities..

2. In summary — why and what

2.1. Why we need to change the AMC/GM

There are two issues addressed by Decision 2017/023/R:

(a) Aircraft tracking systems for large aeroplanes

Aircraft tracking systems are meant to prevent circumstances such as those after the disappearance of the Malaysian Airlines flight MH370 on 8 March 2014, where all communications with the aeroplane and its track were lost abruptly. For two weeks, search and rescue (SAR) efforts were focused on an area close to where the aeroplane was last detected by air traffic control (ATC) surveillance systems, while in fact it had most probably kept flying for several hours after being lost. In addition, a very rough determination of the probable flight path of the aeroplane in the last six hours of the flight was only made possible thanks to the analysis of logon messages exchanged automatically between the aeroplane and the satellites of the telecommunication service provider every hour. It took weeks of work for the safety investigation authorities to analyse this information and infer a research zone, which still represented an area of several tens of thousands of square kilometres[10]. The only physical evidence of the aeroplane was floating debris, which was found more than a year after the accident. After having explored 120 000 square kilometres of the sea floor, the Australian and Chinese authorities decided to stop the underwater search operations. To this date, the location of the aircraft wreckage is unknown and this accident remains unexplained. This highlights the need to permanently track commercial air transport (CAT) flights, even beyond radar coverage, so that an alert can be triggered quickly in case of an abnormal situation. Hence, Annex IV (Part-CAT) to Commission Regulation (EU) No 965/2012[11], CAT.GEN.MPA.205 requires that operators of large aeroplanes establish, as part of the system for exercising operational control over the flight, an aircraft tracking system. Further to that, the Australian Transport Safety Bureau published in October 2017 their final report of the operational search for MH370[12], and this report contains, among others, the following safety recommendations:

(1) 'States ensure that sufficient mechanisms are in place to ensure a rapid detection of, and appropriate response to, the loss of aircraft position or contact throughout all areas of operation' (Safety Recommendation ASTL-2017-003); and

(2) ‘Aircraft operators, aircraft manufacturers, and aircraft equipment manufacturers investigate ways to provide high-rate and/or automatically triggered global position tracking in existing and future fleets’ (Safety Recommendation ASTL-2017-004).

(b) Alternative to installing a low-frequency ULD

Point CAT.IDE.A.285(f) requires some categories of large aeroplanes to be fitted by 1 January 2019 with a ULD that operates at a frequency of 8.8 kHz±1 kHz (hereafter called ‘8.8 kHz ULD’). However, this ULD

[10] For detailed information, please consult the official information published by the Australian Transportation Safety Bureau (https://www.atsb.gov.au/mh370.aspx).

[11] Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1) (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:296:0001:0148:EN:PDF).

[12] The Operational Search for MH370, 3 October 2017, Australian Transport Safety Bureau.

is not required to be installed if the aeroplane is equipped with 'robust and automatic means to accurately determine, following an accident where the aeroplane is severely damaged, the location of the point of end of flight' (refer to point CAT.IDE.A.285 (f)(2)). Point CAT.IDE.A.285(f)(2) actually refers to CAT.GEN.MPA.210 'Location of an aircraft in distress — Aeroplanes' in a non-explicit manner. Since confusion with the emergency locator transmitter (ELT) required by CAT.IDE.A.280 is possible, clarification is necessary.

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 2 of the Basic Regulation. This proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Chapter 2.

The specific objective of this proposal is to facilitate the implementation of aircraft tracking and to clarify the requirement to carry a 8.8 kHz ULD.

2.3. How we want to achieve it — overview of the amendments

An AMC to CAT.GEN.MPA.205 is created to define the minimum conditions on the aircraft tracking equipment, the performance of the position reporting function, the recording of aircraft tracking data and the procedures associated with the aircraft tracking system.

An AMC to CAT.GEN.MPA.205 is created to specify minimum conditions for invoking the exception under CAT.GEN.MPA.205(b) and not track a flight.

GM is created to:

— explain the term 'abnormal flight behaviour' which appears in the definition of an aircraft tracking system,

— provide guidelines to determine when a flight needs to be tracked, and what data should be recorded,

— provide explanation on the influence of the choice of the position reporting period on the effectiveness of the aircraft tracking system, and

— provide reference to ICAO aircraft tracking implementation guidelines.

GM to point (c) of ORO.GEN.110 is slightly amended to remove a risk of misinterpretation.

GM is created to facilitate the correct interpretation of point CAT.IDE.A.285(f)(2) by providing a reference to CAT.GEN.MPA.210.

2.4. What are the stakeholders' views

Comments received during this consultation were overall positive, but some of them requested clarifications or minor corrections on the proposed AMC and GM, in particular with regards to:

— protection of aircraft tracking data when they contain more than just trajectory information;

— position reporting periodicity;

— time between the detection of the aeroplane position and the reception of position data at the operational control over the flights;

— responsibilities of an ANSP with regards to providing information about the extent of the surveillance services;

— alternative means to a low-frequency underwater locating device (such as required by CAT.IDE.A.285).

2.5. What are the benefits and drawbacks

The comments from the stakeholders did not lead to modify the impact assessment. The latter is presented below.

2.5.1 AMC and GM on aircraft tracking systems

(a) The safety impact of the new AMC and GM for CAT.GEN.MPA.205 is expected to be medium positive, because they will facilitate the implementation of CAT.GEN.MPA.205 by giving clear performance objectives while not prescribing a particular technology. By doing so, these new AMC and GM facilitate earlier detection of an abnormal flight behaviour and timely alerting of authorities, increasing the chance to avoid the accident or to reduce its severity (saved lives).

(b) The impact of the new AMC and GM for CAT.GEN.MPA.205 on rule harmonisation is expected to be slightly positive because they bring the implementation of CAT.GEN.MPA.205 closer to the implementation of aircraft tracking recommended by ICAO. However, some differences between CAT.GEN.MPA.205 and the ICAO Standards cannot be 'corrected' at AMC level, they would require amending CAT.GEN.MPA.205. Tables detailing how ICAO Standards were taken into account are presented in Appendix 4.

(c) The new AMC and GM are not expected to have any social or environmental impact.

(d) The new AMC and GM are not expected to have any impact on proportionality issues, because CAT.GEN.MPA.205 excludes:

(1) aeroplanes not operated for CAT;

(2) aeroplanes with a maximum certified take-off mass (MCTOM) of less than 27 000 kg; and

(3) aeroplanes with an MCTOM of less than 45 500 kg and a maximum operating seating configuration (MOPSC) of 19 or less (which is the case for business jet aeroplanes).

(e) The economic impact of the new AMC and GM on industry is expected to be slightly negative for the following reasons:

(1) GM1 CAT.GEN.MPA.205 clarifies that point (a)(1) of CAT.GEN.MPA.205 only affects those aeroplanes capable of automatically transmitting position data without change to the approved airborne systems. Hence, no retrofit of airborne equipment is required.

(2) The current cost of data transmission is such that the transmission of a small data package every few minutes does not make a significant difference in the operating cost. Assuming a conservative assumption of EUR 0.20 per position report[13], with a reporting period of once every 15 minutes such as recommended in AMC1 CAT.GEN.MPA.205, the data transmission cost is EUR 0.80 per flight hour. This is very little in comparison with the

[13] The results of the ICAO survey of data transmission providers, presented at the ICAO multidisciplinary meeting regarding Global Tracking on 12 and 13 May 2014, show that this is a rather conservative assumption (many providers are offering lower transmission cost): see Working Paper 1 of this ICAO meeting.

hourly cost of flying with an aeroplane of an MCTOM of over 27 000 kg (fuel consumption, crew member cost, food and entertainment system, etc.).

(3) Ground-based software is usually needed to assist in the monitoring of tracked flights. This software may need to be fine-tuned to account for specific aspects of the aircraft operation.

(4) Identifying abnormal flight behaviour without delay is critical for the aircraft tracking system to be effective. This means that at any time an aeroplane is airborne, there should be someone at the aircraft operator ready to act upon deviation from normal operation indicated by aircraft tracking data. However, large CAT operators already have on-duty ground staff to follow up their operations, as part of their system for exercising operational control required by ORO.GEN.110(c). Therefore, implementing CAT.GEN.MPA.205 implies adapting procedures and training staff with a slight cost impact.

(5) The objectives defined in AMC1 CAT.GEN.MPA.205 are consistent with the recommendations of the report of the Aircraft Tracking Task Force (hereinafter referred to as the 'ATTF report'), which was prepared by IATA in coordination with the industry (see also Appendix 5).

(f) The economic impact of the new AMC and GM on authorities is expected to be medium positive, because it will increase the chance that SAR teams as well as safety investigation authorities are searching from day one in the right zone, with significant cost savings compared to historical accidents in remote and oceanic areas. In the first two weeks after the accident of the Malaysian Airlines flight MH370, several States deployed means for SAR operations (large vessels, aeroplanes, helicopters, etc.), not only the State of the operator. Unfortunately, the search was focused on a strait close to Malaysia, before safety investigation authorities determined by the means of complex computations that the aeroplane actually ended its flight in around 600 NM off the coast of Australia, i.e. thousands of nautical miles apart. Several tens of millions of euros could have been saved, had the search area been earlier determined.

Table 1: Impact of AMC and GM for CAT.GEN.MPA.205 (from '– – –' = very negative to '+++' = very positive)

	Safety impact	Environmental impact	Social impact	Economic impact	Proportionality issues	Regulatory coordination and harmonisation
Impact	++	0	0	– for industry ++ for authorities	0	+

2.5.2 Alternatives to installing a low-frequency ULDs

The impact of GM1 CAT.IDE.A.285(f)(2) on safety, cost, environment and rule harmonisation is expected to be neutral, because this GM does not change any requirement, it just brings clarification. The social impact is also expected to be neutral because GM1 CAT.IDE.A.285(f)(2) will not affect the conditions of work or the responsibilities of aviation professionals.

Table 2: Impact of GM1 CAT.IDE.A.285(f)(2) (from '– – –' = very negative to '+++' = very positive)

	Safety impact	Environmental impact	Social impact	Economic impact	Proportionality issues	Regulatory coordination and harmonisation
Impact	0	0	0	0	0	0

3. References

3.1. Related regulations

— Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1)

3.2. Affected decisions

— Decision N° 2012/015/R of the Executive Director of the Agency of 24th October 2012, on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council – 'Guidance Material to Annex I – Definitions'

— Decision N° 2014/017/R of the Executive Director of the Agency of 24th October 2012, on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council – 'AMC and GM to Part-ORO – Issue 2'

— Decision 2014/015/R of the Executive Director of the European Aviation Safety Agency of 24 April 2014 adopting Acceptable Means of Compliance and Guidance Material to Part-CAT of Regulation (EU) No 965/2012 and repealing Decision 2012/018/R of the Executive Director of the Agency of 24 October 2012 — 'AMC and GM to Part-CAT — Issue 2'

3.3. Other reference documents

— ICAO Annex 6 Part I (Amendment 41).

— Regulation (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the single European sky (the framework Regulation) (OJ L 96, 31.3.2004, p. 1).

— Commission Implementing Regulation (EU) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation service providers and amending Regulations (EC) No 482/2008 and No 691/2010 (OJ L 271, 18.10.2011, p. 23).

— Commission Regulation (EU) 2015/2338 of 11 December 2015 amending Regulation (EU) 965/2012 as regards requirements for flight recorders, underwater locating devices and aircraft tracking systems (OJ L 330, 16.12.2015, p. 1).

— ICAO High-Level Safety Conference 2015 (Montreal, 2 to 5 February 2015) working paper 11, ATTF report regarding routine aircraft tracking.

— Global Aeronautical Distress & Safety System (GADSS) Concept of Operations, version 6.0, dated 7 June 2017.

— ICAO Circular 347, Aircraft Tracking Implementation Guidelines, Implementation Guidance for Operators and Civil Aviation Authorities, dated 2017.

— BEA, Triggered Transmission of Flight Data working group report, dated 18 March 2011.

— ICAO State Letter AN 11/1.3.31-17/20 of 24 March 2017, on adoption of Amendment 42 to Annex 6, Part I.

— Report of the Normal Aircraft Tracking Implementation Initiative (NATII) of ICAO, dated 1 September 2015.

— ATSB, The Operational Search for MH370, dated 3 October 2017.

— ATSB, MH370 – Definition of Underwater Search Areas, updated 18 August 2014.

— ATSB, MH370 – Flight Path Analysis Update, dated 8 October 2014.

— BEA, Sea Search Operations, accident on 1 June 2009 to the Airbus A330-203 registered F-GZCP.

— Investigation report of the accident to the McDonnell Douglas MD11 registered HB-IWF on 2 September 1998.

— Investigation report of the accident to the Boeing 737 registered 5B-DBY on 14 August 2005.

— Investigation report of the accident to the Avions de Transport Regional (ATR) 42 registered OY-JRJ on 31 January 2005.

— Investigation report of the serious incident to the Boeing 737 registered PH-BDP on 10 February 2010.

— Investigation report of the accident to the Boeing 767 registered G-OOBK on 3 October 2010.

— Investigation report of the serious incident to the Airbus 340 registered F-GLZU on 22 July 2011.

— Investigation report of the serious incident to the Airbus A330 registered OH-LTO on 11 December 2010.

— Investigation report of the accident to the Airbus A330 registered F-GZCP on 1 June 2009.

— Investigation report of the serious incident to the ATR42 registered EI-SLD on 18 January 2007.

— Investigation report of the accident to the Boeing 777 registered G-YMMM on 17 January 2008.

— Investigation report of the accident to the Aerospatiale 332 registered G-JSAR on 21 November 2006.

4. Appendices

4.1. Appendix 1 — CRD to comments received during AB consultation

Appendix 1

CRD to comments received during AB consultation

RELATED NPA/CRD 2013-26 — OPINION NO 01/2014 — RMT.0401— DD.MM.201X

1. Summary of the outcome of the consultation

— Comments received during this consultation were overall positive, but some of them requested clarifications or minor corrections on the proposed AMC and GM. The most significant comments were the following:

— Limit the content of position reports to just trajectory information (comment made by ECA). This comment was not accepted.

— Consider a shorter position reporting period than 15 minutes in case of an emergency (comment made by ECA). This comment was partially accepted.

— The EU requirements on aircraft tracking are not aligned with ICAO Annex 6 standards (comment made by FOCA). This comment was noted.

— It is difficult to comply with the maximum time between the detection of aeroplane position and the reception of position data at the operational control over the flights (comments made by France and Airbus). These comments were partially accepted.

— ANSPs should provide, through aeronautical information publications, information which the operators can readily use in analysing the extent of the ATC services provided (comment made by IATA). This comment was noted.

— Alternative means should be made possible to installing an ETSO-C200 compliant underwater locating device, such as using a passive underwater resonator (comment made by Airbus). This comment was not accepted.

2. Individual comments (and responses)

In responding to comments, a standard terminology has been applied to attest EASA's position. This terminology is as follows:

(a) **Accepted** — EASA agrees with the comment and any proposed amendment is wholly transferred to the revised text.

(b) **Partially accepted** — EASA either agrees partially with the comment, or agrees with it but the proposed amendment is only partially transferred to the revised text.

(c) **Noted** — EASA acknowledges the comment but no change to the existing text is considered necessary.

(d) **Not accepted** — The comment or proposed amendment is not shared by EASA.

(General comments)	-

comment	comment by: *United Kingdom* Following some enquiries from operators and clarification sought from EASA it is recommended that within the new AMC or GM a statement is made explaining that the requirements at CAT.GEN.MPA.205(a)(1) and (2) refer to cumulative conditions: MCTOM > 27 tonnes **and** a MOPSC > 19 pax. This is to prevent interpretation of 'either'/'or'. Justification: Clarity of intent of regulation.
response	Not accepted. The wording of points (a) of CAT.GEN.MPA.205 is consistent with EU rules' wording principles. There is no ambiguity in the text of these points with regards to the fact that only aeroplanes with an MCTOM of over 27 000 kg and a MOPSC of more than 19 are in the scope. Hence no GM is considered necessary for clarification.

comment	comment by: *AIRE* The proposed AMC/GM answers many questions previously raised by AIRE members on aircraft tracking systems. The proposed AMC will enable airlines to determine compliance of their aircraft with the rule that becomes applicable in December 2018. The proposed GM helps in determining whether a flight needs to be tracked and the guidance how to deal with a temporary lack of aircraft tracking data. Considering the uncertainty on retrofit solutions and their feasibility, AIRE supports the pragmatic approach not to mandate any aircraft retrofit. AIRE has no further comments to the accelerated procedure for the proposed draft Decision

	RMT.0401.
response	Noted. Thank you for this feedback.

comment	comment by: *ECA* Please find below some comments from European Cockpit Association concerning the draft Decision 'AMC/GM to IRs related to flight recorders, ULDs and aircraft tracking systems (third set)' (RMT.0401). 1. We appreciate that aircraft tracking will be mandatory, which is a safety improvement 2. We believe that flight tracking in combination with deployable data recorders will provide a very powerful solution in accident investigation 3. In the pilots' community view the data to be streamed shall be strictly limited to data enabling location of the airplane, i.e. Longitude /Latitude, Heading / Track, Ground Speed/ True Air Speed and Altitude. The wording "at least" should therefore be removed. 4. The 15 minute interval mentioned leads to a search area of roughly 1185 square Nm at 480kts. Bearing in mind that it took years to find AF447 wreckage in a much smaller area, we would like to propose the following; In case of an Emergency an automatic change to a "ping rate" of 1 minute to reduce the potential search area. 5. The conditions in table 1 on page 30 do not necessarily prevent another MH370 type event. The way we read and understand the proposal, MH370 would have qualified for not needing to be monitored. We would be grateful if you would consider these inputs and acknowledge receipt. Thank you in advance!
response	1. First comment: noted. 2. Second comment: noted. 3. Third comment: not accepted. This comment is understood as referring to the point of draft AMC1 CAT.GEN.MPA.205 which specifies the content of a position report. It is not considered appropriate to restrict the data allowed to be transmitted to position and speed vector, as additional data (such as the status of essential systems or of engines) could be instrumental to the early detection of an abnormal flight behaviour, or to refine the search area when the aircraft is missing. 4. Fourth comment: Partially accepted. GM5 CAT.GEN.MPA.205 is meant to highlight the influence of the position reporting period on the size of the search area and this GM was modified to include reference to a recommendation made by the Australian Transportation Safety Bureau after the search for Malaysian Airlines flight MH370. However, with currently installed communication equipment and depending on depending on the region of the world, a position reporting period of 1 minute may not always be achievable. It is expected that, in the mid-term, global communication providers and their distribution partners will have developed an infrastructure capable of supporting a shorter reporting period than 15 minutes. In addition, the issue of accurately locating the point of end of flight after an accident is already addressed by CAT.GEN.MPA.210. 5. Fifth comment: Noted. It is assumed that this comment refers to the table in draft

GM2 CAT.GEN.MPA.205. This table only provides an explanation of CAT.GEN.MPA.205. The flight MH370 departed from Kuala Lumpur and its destination was Beijing. Had the operator been subject to CAT.GEN.MPA.205, it would have had to track the aircraft throughout the flight 'except when the planned route and the planned diversion routes are fully included in airspace blocks where:

a. ATS surveillance service is normally provided which is supported by ATC surveillance systems locating the aircraft at time intervals with adequate duration; and
b. the operator has provided to competent air navigation service providers necessary contact information.'

It should also be noted that CAT.GEN.MPA.205 is a rule for air operations. Issues related to the coordination between ANSPs and with military ATC are not in the scope of CAT.GEN.MPA.205.

comment

comment by: *Spain*

Propose to add a modification to GM1 ORO.GEN.110(c) paragraph (a):

- CAT.GEN.MPA.205 requires by 16 December 2018 at the latest, that the operator shall establish and maintain an aircraft tracking system for some types of airplanes (depending of MTOM and CofA) when flying in certain airspaces.
- ORO.GEN.110 (c) states that "the operator shall establish and maintain a system for exercising operational control over any flight operated under the terms of its certificate, SPO authorization or declaration".
- GM1 ORO.GEN.110(c) points out in paragraph (a) that this "does not imply a requirement for licensed flight dispatchers or a full flight watch system".
- According to ICAO Doc. 9976 Flight Planning and Fuel Management definitions:

  Flight Watch: in addition to all of the elements defined for Flight Following and Flight Monitoring, Flight Watch includes the active tracking of a flight by suitably qualified operational control personnel throughout all phases of the flight to ensure that it is following its prescribed route, without unplanned deviation, diversion or delay and in order to satisfy State requirements.

So it can be concluded that CAT.GEN.MPA.205 is indeed requiring a Flight Watch system. To avoid any contradictions, the proposal is to modify GM1 ORO.GEN.110(c) paragraph (a) to read as follows:

(a) ORO.GEN.110(c) does not imply a requirement for licensed flight dispatchers or a full flight watch system, ***except, for the latter, as required by CAT.GEN.MPA.205***.

response

Partially accepted.
The content of GM1 ORO.GEN.110 (c) comes from JAA Temporary Guidance Leaflet (TGL) 44, ACJ OPS 1.195. The purpose of the statement in ACJ OPS 1.195 that 'this does not imply a requirement for (…) a full flight watch system' was probably to avoid over-interpretation of point (c) of OPS 1.195 at that time. However it is considered that as of today, this risk of misinterpretation is remote.

In addition, the term 'flight watch system' is not defined or explained in the rules for air operation. This term is only used in GM1 ORO.GEN.110 (c).

	Therefore, the most appropriate solution seems to rephrase point (a) of GM1 ORO.GEN.110 (c) as follows: '(a) ORO.GEN.110(c) does not imply a requirement for licensed flight dispatchers ~~or a full flight watch system~~.'
comment	comment by: *Sweden* Thank you for the opportunity to comment on the draft AMC/GM to implementing rules related to flight recorders, underwater locating devices and aircraft tracking systems (third set). Please be advised that Sweden supports the proposal.
response	Noted. Thank you for this feedback.
comment	comment by: *Switzerland* The Federal Office of Civil Aviation (FOCA) would like to thank the Agency for the opportunity to comment on the draft AMC/GM. The AMC and GM to the implementing rules related to flight recorders, underwater locating devices (ULD) and aircraft tracking systems are further enhancing and clarifying existing IRs in the PART-CAT of the Air operations (EU) No 965/2012 regulations. However, in our opinion, the rule making task RMT.0401 failed to align the ICAO SARPS with the PART-CAT rules as depicted in table B.1 – Main differences between Standards in ICAO Annex 6 PART 1 and CAT.GEN.MPA.205; and as well in table B.2 - Comparison between the ICAO SARPS related to A/C tracking and CAT.GEN.MPA.205 and AMC/GM to CAT.GEN.MPA.205. We believe that this could cause significant ambiguity among airline operators as the standards vary quite notably, for example regarding the mass category and requirements. Hence, ICAO depicting the requirement for A/C of more than 45’500 kg MCTOM versus CAT.GEN.MPA.205 the requirement shall be fulfilled for A/C with a MCTOM of more than 27’000 kg. There are many more examples where the requirements differ between the ICAO SARPS and CAT.GEN.MPA.205. Generally, it is of utmost importance that the regulation regarding In-flight recording for A/C shall be proportionate and reasonable in order to minimize the burden for the Aviation community, which have limited human and financial resources. It has to be highlighted that these rules are implemented in the aftermath of the disappearance of the Malaysian Airlines B-777 MH-370 as a possible mitigation. FOCA is supporting the implementation of the subject AMCs and GMs with the above comments.
response	Noted.

CAT.GEN.MPA.205 was adopted unanimously by the committee established by Article 65 of the Basic Regulation, composed of experts of the European Commission and EU Member States. EASA has just an observer role in this committee. EASA has not proposed amendments to fully align CAT.GEN.MPA.205 with ICAO Annex 6 Part I Standards, since no such request was made by the Commission or EU Member States, and because CAT.GEN.MPA.205 is considered to be more safety- and cost-effective than with ICAO Annex 6 Part I Standards on several aspects.

For example, CAT.GEN.MPA.205 and its draft AMC/GM have been worded in such a manner that airborne equipment retrofit won't be necessary, while the ICAO standards related to aircraft tracking do not offer any kind of alleviation for aeroplane manufactured before their entry into force. Another example: according to Annex 6 Part I, 3.5.1, all operators performing international CAT with aeroplanes shall demonstrate an aircraft tracking capability, regardless of the MCTOM or the MOPSC of the operated aeroplanes. On the other hand CAT.GEN.MPA.205 is not applicable to aeroplanes with a MCTOM of less than 27 000 kg.

Regarding the mass categories in the scope of CAT.GEN.MPA.205, it should also be noted that aeroplanes with an MCTOM of 45 500 kg or less and an MOPSC of 19 or less are not required to be part of the aircraft tracking system.

Comments on the draft AMC and GM -

Comments on draft AMC1 CAT.GEN.MPA.205 Aircraft tracking system - Aeroplanes

comment

comment by: *Airbus(on behalf of ASD)*

Issue and justification:
Performance constraint difficult to be checked on 100% of the cases. It depends many on on-board, network and ground systems. In case of temporary loss or unexpected issue, the time specification cannot be guaranteed. Such cases should be considered.

Proposal and proposed text:
(c) Delay from position determination to position reception
The total delay between the time when the position of an aeroplane is determined and the time when the corresponding position report is received by the operational control over the flight should not exceed 10 minutes under normal operational conditions, except if there is a temporary loss or an unexpected issue.

response

Partially accepted.
Point (c) of AMC1 CAT.GEN.MPA.205 has been removed. Please see the response to the comment of France on this point.

comment

comment by: *France*

(comment on the point of AMC1 CAT.GEN.MPA.205 titled 'Delay from position detection to position reception')

	DGAC France wonders how operators could meet and show that they meet such a requirement. Does it depend on their organisation or on particular technology or on the choice of telecom operator? For instance, the delay may be impacted by the certified on-board function transmitting the position from the aircraft
response	Partially accepted. This point of AMC1 CAT.GEN.MPA.205 has been removed. Instead, the point of AMC1 CAT.GEN.MPA.205 on the sources of position data has been completed to limit the time between position being detected and position being received at the operational control over the flight. In particular, depending on the data source, different time objectives are set: 1. The data source is aeroplane systems. In this case, since the acceptable aeroplane systems are the navigation system or an approved GNSS receiver, it is assumed that they will determine the aircraft position within a timeframe adequate for aircraft tracking. Then, data transmission to the ground usually relies on long-distance communication service providers which are capable of transmitting the data within a few seconds to a few minutes depending on the channel used and other factors. Hence, a condition has been added to recommend that the delivery time (from emission by the aeroplane to reception at the operational control over the flight) does not exceed 10 minutes, to the extent possible. In order to demonstrate this delivery time, the operator may check that the communication service providers it relies on for the purpose of aircraft tracking have specified a delivery time objective as part of their announced performance. Otherwise, the operator may also set up an automatic monitoring of the delivery time, by comparing the time stamp contained in the position report with the time at which this report has been received by the operational control over the flight. 2. The data source is the flight crew (for example when the planned flight duration is less than two position-reporting periods). In that case it is preferable to not set a delivery time objective, given that the flight crew primary duties take precedence over reporting the aircraft position; 3. The data source is ATC surveillance systems. ATC surveillance systems are capable of detecting the position of aircraft in a timeframe which is consistent with the purpose of aircraft tracking. SSR and Mode-S radar are locating aeroplanes with an active SSR transponder every 4 to 12 seconds. Even in the case of ADS-C data, ICAO doc 9869 (Performance-based Communication and Surveillance Manual) has defined required surveillance performance (RSP) specifications. In particular, the RSP overdue delivery time (OT), i.e. the maximum time for the successful delivery of surveillance data after which time the initiator is required to revert to an alternative procedure should be 170 seconds for the ADS-C application (refer to ICAO Doc 9869, Appendix C, subsection 2.1.3). While delivery time objectives of ICAO Doc 9869 have not been transposed into the EU rules, they are already used by satellite communication service providers. However, the delay with which the ATC surveillance data will be made available to operators is not known. Hence, when relying on ATC surveillance data for aircraft tracking, the operator should also check that the delay between detection of the aeroplane position by the ATC surveillance systems and making this aeroplane position available remains less than 10 minutes.

comment	comment by: *France* comment on the point ofAMC1 CAT.GEN.MPA.205 titled 'Content of position reports') DGAC France is not sure to have understood the exact meaning of the proposal. DGAC France suggests to modify the Agency proposal in order to avoid any confusion, as follows : Each position report should contain at least the latitude, the longitude and the time of position determination and whenever available, an indication of the aeroplane altitude. ~~except that~~ In addition, for each flight: (1) One of the position reports may ~~-~~contain only time-stamped data indicating that the aeroplane has left the gate; and (2) One of the position reports may contain only time-stamped data indicating that the aeroplane has become airborne; and (3) One of the position reports may contain only time-stamped data indicating that the aeroplane has landed; and (4) One of the position reports may contain only time-stamped data indicating that the aeroplane has reached the gate.
response	Not accepted. The rephrasing proposal contained in this comment would modify the meaning of AMC1 CAT.GEN.MPA.205, therefore it is not accepted. AMC1 CAT.GEN.MPA.205 does not require to provide the data listed in (c)(1), (2), (3) and (4) in addition to other position reports. AMC1 CAT.GEN.MPA.205 just allows that for each tracked flight, up to four position reports contain data listed in (1), (2), (3) and (4) instead of latitude, longitude, time and altitude. Indeed, the position of departure and destination aerodromes are obviously known, so that latitude and longitude are not considered necessary when the aeroplane is known to be on the ground. For a departing aeroplane, it is considered acceptable that the position report does not contain latitude, longitude and altitude, but only data indicating the time at which the aeroplane has left the gate or the time at which the aeroplane has become airborne. Similarly, data indicating the time at which the aeroplane has reached the gate at the destination aerodrome or the time at which it has landed is sufficient for a position report made at destination.
comment	comment by: *France* (comment on the point of AMC1 CAT.GEN.MPA.205 titled 'Sources of position data') DGAC France does not understand the reason of (1). If the position report comes from ATC surveillance systems, we would have said that, according to CAT.GEN.MPA.205 (b), it would have implied that the conditions not to require the aircraft to be tracked, are met.

	In (3) , DGAC France suggests to replace : “navigation system of the aeroplane or an approved GNSS receiver” by “RNAV system” (which could be an FMS or a GNSS stand-alone system). Indeed: Conventional navigation systems (ILS, VOR, DME, ADF) give deviations information from a radioelectric beam, an RNAV system is necessary to get lat long information.
response	First comment: noted. CAT.GEN.MPA.205 requires tracking the aircraft except when the planned routes (normal and diversion) are fully included in airspace covered by ATS surveillance service supported by ATC surveillance systems ‘locating the aircraft at adequate duration’ and the operator has provided all competent ANSPs along these routes with the necessary contact information. This means that if any portion of the planned route or a planned diversion route does not meet these conditions then the flight shall be tracked ‘from take-off to landing’. However, even in this case, the operator may use data from ATC surveillance systems where they are available. These principles are explained in GM2 CAT.GEN.MPA.205. Second comment: not accepted. Area navigation (RNAV) designates a particular method of navigation (refer to the definition of ‘Area navigation’ in Part-Definitions of the air operation rules). There is no reason for referring to area navigation. Whatever the aids used by the navigation system of the aeroplane to determine the latitude and longitude, they are considered acceptable.
comment	comment by: *IATA* (Issue) We salute the flexibility provided by this possibility inserted by EASA in the AMC. We believe this can be further expanded with appropriate documented procedures. This addition has the advantage that MEL procedures may dictate the transmission of position reports by the crew in case of malfunctions of automated equipment and alternate means of position reporting due to enroute circumstances like Space weather degrading communication channels. (Proposed text) (e) Sources of position data The data contained in a position report may come from: (1) ATC surveillance systems; (2) the flight crew, if the planned flight duration is less than two position reporting periods or is part of an MEL operations procedure, FCOM (Flight Crew Operations Manual or equivalent) procedure; or (3) aeroplane systems. In that case: (…) (4) A ground service provider (GSP) for messages (d) (1) to (4).
response	First comment: noted

	Point (a) of CAT.GEN.MPA.205 specifies that 'the aircraft tracking system should rely on equipment capable of automatically detecting and transmitting a position report to the aircraft operator' (similar to ICAO Standard 3.5.3 in ICAO Annex 6 Part I, Chapter 3). This is because the primary role of the flight crew member is to ensure the safe conduct of the flight, and this takes precedence over routinely reporting the aeroplane position. In addition, in a situation where aircraft tracking is expected to be useful, all the flight crew members' capacity should be dedicated to immediate flight safety actions, such as keeping control of the aircraft or going through an emergency checklist. AMC1 CAT.GEN.MPA.205 permits loss of aircraft tracking data 'due to a temporary or unexpected issue prior to or during the flight'. The operator is not expected to organise manual reporting of the aeroplane position by the flight crew in such case. The operator may still establish procedures regarding manual reporting when aircraft tracking is not required, however, this is out of scope of AMC1 CAT.GEN.MPA.205. Second comment: partially accepted The term 'ground service provider' is not defined in the air operation rules. Therefore, the principle of this comment is accepted but another text than proposed is inserted: '(4) any data source when the position report is of a type designated by (c)(1), (c)(2), (c)(3) or (c)(4). In that case, the delivery time of position reports from the data source to the operational control over the flight should, to the extent possible, not exceed 10 minutes.'.
comment	comment by: *IATA* (No Issue statement) (Proposed text) (f) Temporary lack of aircraft tracking data Aircraft tracking data may be incomplete due to a temporary or unexpected issue prior to or during the flight. However, a continuing or recurrent lack of aircraft tracking data affecting a given aeroplane or a given route should, when not addressed by the minimum equipment list, be solved if practicable within 30 days of discovery
response	Partially accepted. The proposed insertion of 'if practicable' would imply cases where aircraft tracking data could be missing for an indefinite period for some aeroplanes or over some routes, while CAT.GEN.MPA.205 requires flights to be tracked. An AMC cannot contradict an implementing rule. The only way for an operator facing a lack of aircraft tracking data which cannot be solved would be to require an exemption from CAT.GEN.MPA.205. However, it is recognised that following an exemption process would require significant justification efforts from the side of the operator. Therefore, the objective of 30 days for solving the systematic lack of aircraft tracking data has been replaced by 'in a timely manner' to provide for more flexibility depending on the cause of the issue (e.g. inoperative equipment which can be addressed by the MEL, issue with the infrastructure of the communication service provider, etc.). In addition, a point has been added to recommend that the operator identifies all losses of aircraft tracking data which are not due to temporary issues, because this is necessary for detecting and addressing any systematic lack of aircraft tracking data affecting a given aeroplane or a given route.

Comments on draft AMC2 CAT.GEN.MPA.205 Aircraft tracking system - Aeroplanes

comment	comment by: *IATA* (Issue) ANSPs should provide through AIPs (other aviation data sources/ NOTAMs) information that the Operators can readily use in analysing the extent of the services provided. Even if not the subject of this Regulation, EASA should consider a related inclusion in the ATM/ANS domain. (No text proposed)
response	Noted. ICAO Annex 15 (14th Edition) Appendix 1 defines the content of the AIP and it includes description of the secondary surveillance radar operating procedures and of the automatic dependent surveillance broadcast (ADS-B) procedures and a graphic portrayal of the areas of radar coverage and ADS-B coverage (refer to Appendix 1 of ICAO Annex 15, Section ENR 1.6). Regulation (EU) 2017/373 Annex VI, Subpart B AIS.TR.100 requires the following: 'An aeronautical information services provider shall be able to demonstrate that their working methods and operating procedures are compliant with the standards in the following Annexes to the Chicago Convention as far as they are relevant to the provision of aeronautical information services in the airspace concerned: (a)… (b) without prejudice to Commission Regulation (EU) No 73/2010 (1), Annex 15 on aeronautical information services in its 14th edition of July 2013, including all amendments up to and including No 38.' In addition, ICAO is evaluating the need for additional standards and recommended practices requiring ANSPs to publish, in their AIP, current information on all system(s) used by ATS units to receive aircraft position information, their associated coverage area(s) and, when applicable, the position reporting time intervals. EASA is following up this discussion.

Comments on draft GM2 CAT.GEN.MPA.205 Aircraft tracking system - Aeroplanes

comment	comment by: *Airbus (on behalf of ASD)* Issue and justification: It would be useful to understand the term "a temporary or unexpected issue". For this purpose, AIRBUS proposes to provide some examples. Proposal and proposed text: Lack of aircraft tracking data due to a temporary or unexpected issue may be acceptable (refer to AMC1 CAT.GEN.MPA.205). Such issues may include: Loss of link capabilities due loss of onboard equipment or loss of electrical power for this equipment; Loss of link coverage with satellites; Issues of HF communications (e.g. heavy weather); Issues with ground infra-structure of network and host-computers.
response	Accepted. Examples were added to the second note of Table 1 of GM2 CAT.GEN.MPA.205.

comment	comment by: *IATA* (Issue) ANSPs should provide through AIPs (other aviation data sources/ NOTAMs) information that the Operators can readily use in analysing the extent of the services provided. (Proposed text) NOTE: Air Navigation Service Providers (ANSPs) need to publish in their AIP if they are capable of tracking the aircraft (and for which area) to comply with Condition ½. It should be the ANSP's obligation to publish when they cannot fulfil the requirement.
response	Not accepted. The issue pointed by IATA is acknowledged, however, a recommendation to ANSPs is out of the scope of the rules for air operation. See also EASA response to IATA comment on AMC2 CAT.GEN.MPA.205.

Comments on draft GM1 CAT.IDE.A.285(f) Flight over water

comment	comment by: *Airbus (on behalf of ASD)* Issue and justification: The first part of GM1 is clear, when it just refers to means that are required by CAT.GEN.MPA.210 'Location of an aircraft in distress'. This statement is sufficient for the time being, until EASA will issue AMC/GM for this paragraph CAT.GEN.MPA.210 (EASA GM/AMC is delayed for a later issue). The last part concerning automatic ELT could be removed as it does not contribute to clarification. Proposal and proposed text: ROBUST AND AUTOMATIC MEANS TO LOCATE THE POINT OF END OF FLIGHT AFTER AN ACCIDENT CAT.IDE.A.285(f)(2) refers to the means such as that required by CAT.GEN.MPA.210 'Location of an aircraft in distress'. The adjective 'robust' in CAT.IDE.A.285 (f)(2) indicates that this means is designed to provide the location of the point of end of flight in non-survivable accident scenarios as well as in survivable accident scenarios. ~~Unless otherwise specified, an automatic ELT is usually designed and installed for conditions that correspond to survivable accidents~~
response	Accepted. The primary driver for introducing GM1 CAT.IDE.A.285(f) is the need to clarify that conventional automatic ELTs currently installed on aeroplanes cannot be used to obtain alleviation from installing a low frequency ULD under point (f)(2) of CAT.IDE.A.285. However, the underlying issue is to clarify that 'robust' in CAT.GEN.MPA.210 means being able to provide for localisation of the point of end of flight also in the case of a non-survivable accident (that is to say: means which are only designed for conditions corresponding to survivable accidents are not considered 'robust' in this context).

comment	comment by: *Airbus (on behalf of ASD)* Issue and justification: **CAT.IDE.A.285(f)** requires a securely attached underwater locating device that operates at a frequency of 8,8 kHz ± 1kHz. AMC1 provides the reference to an associated ETSO(C200), which in turn specifies the performance of this LOW-FREQUENCY UNDERWATER LOCATING DEVICE. This part of the regulation CAT.IDE.A.285(f) is prescriptive. The Means mentioned in AMC1 may be substituted by other means, which provides the same, or even better performance as specified in ETSO(C200), and SAE International's Aerospace Standard (AS) 6254A, Minimum Performance Standard for Low Frequency Underwater Locating Devices (Acoustic) (Self-Powered). The GM2 should provide viable option to install alternative solutions that operates at same or better performance. Notice: AIRBUS investigated a technology (installation of a Passive Underwater Resonator (PUR)) that has promising features and similar location performance as LF-ULB. The PUR is a non-electrical, passive device which reflects incoming acoustic signals of specific frequencies. It consists of two concentric spherical bodies and does not require scheduled maintenance. Its installation envelope and range are similar to those of the LF-ULD. SAR vessels generally have equipment on board to use PURs as devices for localisation of underwater targets. Proposal and proposed text: GM2 Alternative Means for LOW-FREQUENCY UNDERWATER LOCATING DEVICE Operators may install alternative means for underwater location of the wreckage, provided that the performance is identical or even better than LF-ULDs, and that the search equipment is readily available for wreckage search mission. Equipment, considered as a candidate for alternative means, should be approved by demonstrating the minimum performance similar as determined by ETSO-C200, and SAE International's Aerospace Standard (AS) 6254A.
response	Not accepted. Although AMC1 CAT.IDE.A.285(f) was not part of this consultation, this comment is still considered because it pertains to the issue of complying with point (f) of CAT.IDE.A.285, which in the scope of this draft Decision. The proposal by Airbus to create GM for allowing operators to 'install alternative means for underwater location of the wreckage' is considered inadequate, because AMC are the right instrument for defining means of compliance, not GM. In addition, an AMC is not binding, and regulated entities may submit an alternative means to comply with an implementing rule. In particular, Annex II to Regulation (EU) No 965/2012 (Part-ARO), ARO.GEN.120 contains requirements related to the approval of alternative means of compliance. While industry standards (SAE AS6254 and AS6254A) exist and are recognised by FAA TSO-C200a and EASA ETSO-C200 for airframe low-frequency underwater locating devices, no such industry standard exists for a passive underwater resonator (PUR) destined to be installed on board an aircraft. In addition, the appropriateness of the PUR technology for locating an aircraft wreckage after an accident has not been assessed. This would include for example

the crashworthiness specifications defined in SAE AS6254 (impact shock corresponding to 1 000 g along all three axes, static crush corresponding to 5 000 lbf for 5 minutes) and other test requirements specified in RTCA/DO-160G[14]. A questionable assumption in the Airbus proposal is that search and rescue teams worldwide are equipped with sonars appropriate for the PUR. In reality, the emission frequencies of sonars used by SAR means are very diverse and most of them could not be easily adjusted to the resonance frequency of the PUR. If an alternative technology to the LF-ULD was demonstrated to be adequate for the purpose of point (f) of CAT.IDE.A.285, either through the approval of an alternative means of compliance or through a recognised industry standard, then an amendment to AMC1 CAT.IDE.A.285(f) could be considered.

Comments on the rationale in detail	-

Comments on 3.2.1.4 AMC related to equipment, performance and procedures

comment	comment by: *IATA* (Issue) It has to be taken into account that certain airspace access requirements – especially in oceanic airspace- are less restrictive e.g. RNP 4/5/10 etc. In practice the navigation performance of aircraft is better however any actual navigation performance achieved to allow operations in a specific airspace (also allowed by MEL) should be satisfactory for the tracking requirements. (No text proposed)
response	Accepted. This consideration is now mentioned in the rationale in detail.

[14] Environmental Conditions and Test Procedures for Airborne Equipment.

4.2. Appendix 2 – detailed rationale of the amendments

4.2.1 AMC and GM on aircraft tracking systems

4.2.1.1 Definitions of the terms used

The following definitions are used for the explanations on the proposed AMC and GM on aircraft tracking systems:

(a) Definitions provided in Regulation (EC) No 549/2004[15]:

(1) 'airspace block' means an airspace of defined dimensions, in space and time, within which air navigation services are provided;

(2) 'air navigation services' means air traffic services; communication, navigation and surveillance services; meteorological services for air navigation; and aeronautical information services;

(3) 'air traffic services' means the various flight information services, alerting services, air traffic advisory services and ATC services (area, approach and aerodrome control services);

(4) 'alerting service' means a service provided to notify relevant organisations regarding aircraft in need of search and rescue aid, and to assist such organisations as required;

(5) 'air traffic control (ATC) service' means a service provided for the purpose of:

(i) preventing collisions:

(A) between aircraft; and

(B) in the manoeuvring area between aircraft and obstructions; and

(ii) expediting and maintaining an orderly flow of air traffic.

(6) 'surveillance services' means those facilities and services used to determine the respective positions of aircraft to allow safe separation

(b) Definitions adapted from Regulation (EC) No 549/2004:

(7) 'ATC surveillance system' means the aggregation of airborne and ground-based constituents, as well as space-based equipment, that provides support for the surveillance services;

(c) Definitions in Annex I to Commission Regulation (EU) No 965/2012:

(1) 'aircraft tracking' means a ground-based process that maintains and updates, at standardised intervals, a record of the four-dimensional position of individual aircraft in flight;

[15] Regulation (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the single European sky (the framework Regulation) - Statement by the Member States on military issues related to the single European sky (OJ L 96, 31.3.2004, p. 1) (http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1499247440542&uri=CELEX:32004R0549).

(2) 'aircraft tracking system' means a system that relies on aircraft tracking in order to identify abnormal flight behaviour and provide alert.

4.2.1.2 A few explanations regarding the implementing rule (CAT.GEN.MPA.205)

(a) The following point contains the requirements on aircraft tracking:

'CAT.GEN.MPA.205 Aircraft tracking system — Aeroplanes

(a) By 16 December 2018 at the latest, the operator shall establish and maintain, as part of the system for exercising operational control over the flights, an aircraft tracking system, which includes the flights eligible to (b) when performed with the following aeroplanes:

(1) aeroplanes with an MCTOM of more than 27 000 kg, with an MOPSC of more than 19, and first issued with an individual CofA before 16 December 2018, which are equipped with a capability to provide a position additional to the secondary surveillance radar transponder;

(2) all aeroplanes with an MCTOM of more than 27 000 kg, with an MOPSC of more than 19, and first issued with an individual CofA on or after 16 December 2018; and

(3) all aeroplanes with an MCTOM of more than 45 500 kg and first issued with an individual CofA on or after 16 December 2018.

Flights shall be tracked by the operator from take-off to landing, except when the planned route and the planned diversion routes are fully included in airspace blocks where:

(1) ATS surveillance service is normally provided, which is supported by ATC surveillance systems locating the aircraft at time intervals with adequate duration; and

(2) the operator has provided to competent air navigation service providers necessary contact information.'

(b) The term 'aircraft tracking system' designates the system to be implemented to monitor the flights and alert in case of an abnormal flight behaviour (refer to 3.2.1.1). This term encompasses the provision of equipment and automatic processing capability as well as the procedures to be followed by the operator's staff.

(c) Because of the uncertainty on retrofit solutions and their feasibility, two cases are considered in CAT.GEN.MPA.205:

(1) aeroplanes first issued with an individual certificate of airworthiness (CofA) before 16 December 2018: only those aeroplanes already equipped with a capability to provide a position additional to the secondary surveillance radar (SSR) transponder shall be included in the aircraft tracking system of the aircraft operator.

(2) aeroplanes first issued with an individual CofA on or after 16 December 2018: they shall be included in the aircraft tracking system, since equipment can be forward-fitted on those aeroplanes.

(d) European aircraft operators must already have a system for exercising operational control of

their flights according to ORO.GEN.110 'Operator responsibilities'[16], but the operational control over the flight is not necessarily assisted by periodic position reporting. CAT.GEN.MPA.205 states that, when required, the aircraft tracking system must be integrated to the system for exercising operational control over the flight.

(e) CAT.GEN.MPA.205 requires that flights are tracked 'by the operator from take-off to landing', because continuous and seamless aircraft tracking is essential for detecting deviations from normal operation. However, it does not require that the subject aeroplanes are fitted with dedicated tracking equipment transmitting the aircraft position all along the flight. This makes it possible for the operator to rely on data produced by ATC surveillance systems.

(f) CAT.GEN.MPA.205 provides an exception when the planned routes (normal and diversion) are fully included in airspace covered by ATS surveillance service supported by ATC surveillance systems 'locating the aircraft at adequate duration' and the operator has provided the competent air navigation service providers (ANSPs) with the necessary contact information. Indeed, an ATS unit providing the ATS surveillance service is always providing the alerting service. However, for quickly detecting the emergency (when the flight crew fails to trigger an alert), the ATS unit should be able to rely on ATC surveillance systems that locate the aeroplane accurately and frequently enough (e.g. SSR, Mode-S radar, automatic dependent surveillance - broadcast (ADS-B) stations, etc.), and it should be able to alert the aircraft operator in case of an emergency situation such as defined in ICAO Annex 11 Chapter 5[17].

(g) Appendix 4, Table 1 presents the main differences between Standards addressing aircraft tracking in ICAO Annex 6 Part I and CAT.GEN.MPA.205. The industry should be aware of these differences and that they cannot be 'corrected' by AMC and GM (because AMC and GM cannot contradict an IR). Solving these differences is outside the scope of Decision 2017/023/R.

4.2.1.3 GM proposed for the definition of aircraft tracking

(a) It is proposed to add a paragraph in GM1 to Annex I to Commission Regulation (EU) 965/2012 (Definitions) in order to explain the term 'abnormal flight behaviour', which appears in the definition of an aircraft tracking system. Two conditions are proposed for considering that an event is an 'abnormal flight behaviour':

(1) It is outside the parameters defined by the operator for normal operation or it indicates an obvious deviation from normal operation; and

(2) The operator has determined that it poses a risk for the safe continuation of the flight or for third parties.

(b) Hence:

(1) An abnormal flight behaviour implies that a deviation from normal operation has been detected by the operator. The detection of a deviation from normal operation may be

[16] Refer to Part-ORO, ORO.GEN.110(c): 'The operator shall establish and maintain a system for exercising operational control over any flight operated under the terms of its certificate (…).'

[17] According to ICAO Annex 11 Chapter 5, the ANSP is responsible for providing the alerting service for all aircraft it provides with air navigation services. In Europe, Annex II to Commission Implementing Regulation (EU) No 1035/2011 requires that ANSPs demonstrate that their working methods and operating procedures are compliant with the Standards in ICAO Annex 11, which means that they must among other things provide the alerting service and contact quickly the operator of an aircraft in case of an uncertainty or alert situation.

supported by predefined parameters established by the operator (such as excessive vertical speed, or abnormal low altitude in a location where the aeroplane should be at a cruise altitude). A deviation from normal operation may also be obvious for the operator's staff performing the operational control over the flight, e.g. when the aircraft track has drifted far away from the planned route without any known reason, or when the aircraft track is lost during cruise.

(2) However, a deviation from normal operation becomes an abnormal flight behaviour only after the operator has made an assessment according to which this deviation is of risk for the safe continuation of the flight or for third parties. This is because a significant proportion of deviations detected with aircraft tracking are likely to be triggered by events which do not affect safety (such as a deviation from the planned route in order to avoid rapidly developing adverse weather). Such events could be quickly discarded, for instance by checking other operational information (flight plan, messages related to aeronautical operational control, etc.) or by contacting the flight crew.

4.2.1.4 AMC related to equipment, performance and procedures

Note: In accordance with the performance-based approach agreed with the EASA Committee on aircraft tracking, the content of the AMC and GM to CAT.GEN.MPA.205 is organised according to the following principles: performance objectives in the AMC, explanations and examples of solutions in the GM.

The following principles are proposed as the means to comply with CAT.GEN.MPA.205:

(a) Automatic tracking of aeroplane position

(1) While CAT.GEN.MPA.205 does not explicitly prohibit the reporting of position by a flight crew member (using, for instance, high frequency (HF)/very high frequency (VHF) voice communications or data link communications), manual position reporting is not considered an efficient solution. This is because the primary role of the flight crew member is to ensure the safe conduct of the flight, and this takes precedence over routinely reporting the aeroplane position. In addition, in a situation where aircraft tracking is expected to be useful, all the flight crew members' capacity should be dedicated to immediate flight safety actions, such as keeping control of the aircraft or going through an emergency checklist. Furthermore, aircraft tracking data is expected to be obtained with an accuracy in time and space, which, given the speed of an aeroplane in cruise, is challenging for human beings (see paragraph (e) of AMC1 CAT.GEN.MPA.205). Finally, it should be noted that ICAO Standard 3.5.3 in ICAO Annex 6, Part I, Chapter 3, requires the operator to track the position of the aeroplane 'through automated reporting'.

(2) However, in the particular case where the flight duration is less than two position reporting periods, then the aircraft position needs to be reported only once during the flight, so that this may still be performed by the flight crew. This particular case is addressed in sub-paragraph (e)(2) of AMC1 CAT.GEN.MPA.205.

(b) Position reporting period

The maximum time interval between two successive position reports specified in paragraph (b)

of AMC1 CAT.GEN.MPA.205 is 15 minutes. Paragraph (b) of AMC1 CAT.GEN.MPA.205 and GM4 CAT.GEN.MPA.205 rely on the following considerations:

(1) Tracking of the aeroplane during normal and abnormal operation:

(i) Aircraft tracking by the aircraft operator is useful in normal and abnormal operations, i.e. typically in the phases preceding an emergency situation. Aircraft tracking is proposed to complement the means defined in CAT.GEN.MPA.210. Such means will be triggered in case of a situation likely to be catastrophic. However, such means are only required for aeroplanes manufactured after 1 January 2021, meaning that it will take years before CAT.GEN.MPA.210 is fully implemented.

(ii) Aircraft tracking is not meant to replace ELTs, which are required by the air operation rules (refer to CAT.IDE.A.280).

(iii) Therefore, it is not needed to tailor the reporting periodicity to a location accuracy desirable for SAR. The track recorded by the aircraft tracking system would be useful to help narrow the search area; however, the primary function of providing localisation data after an accident should remain with a system specifically designed for that purpose, such as the ELTs or the future means for location of an aircraft in distress.

(iv) Nevertheless, the loss of the Air France flight AF447 as well as the Malaysian Airlines flight MH370 highlighted the long delays taken by aircraft operators and ANSPs in triggering an alert, which contributed to great difficulties in locating the aeroplanes afterwards. A seamless aircraft tracking and an earlier alert could have made a significant difference. Hence, the reaction time (time for detecting an abnormal situation) should be the main driver in order to determine an appropriate periodicity for position reporting.

(v) Ideally, the aircraft operator should be able to determine within 30 minutes of an event whether the competent ANSPs and authorities should be alerted. This is because actions such as re-locating the aircraft require quick assessment (this is also consistent with the provisions related to the uncertainty phase and alert phase of ICAO Annex 11 Chapter 5). This assessment typically requires checking other operational information such as the flight plan, messages related to aeronautical operational control (AOC) or airline administrative control (AAC) and exchanged with the involved aeroplane, weather information, attempt to contact the flight crew and/or competent ANSPs, etc.

(vi) This also implies quick detection of deviations from normal operation. This could be achieved by the automatic transmission of data by the aircraft, indicating an unsafe situation, or by relying solely on the aircraft track. In the latter case, assuming that an aircraft track deviation or a loss of track is to be detected within a given time T, the position reporting period should be less than T, also taking into account the fact that the event confirmation will most likely require more than one reporting period.

(2) Possible benefits for SAR and for the investigation when the aeroplane is not equipped with means for locating an aircraft in distress and the aeroplane's ELTs do not successfully

emit a signal[18]:

(i) By 16 June 2018, all flight recorders installed on an aeroplane operated for CAT are required to be fitted with ULDs with a minimum transmission time of 90 days (hereinafter referred to as '90-day ULDs'[19]): refer to CAT.IDE.A.185 and CAT.IDE.A.190.

(ii) In the case of an accident over water, it is assumed that 90-day ULDs would allow underwater search operations to cover an underwater area of around 7 000 km^2 before the ULD signal fades out[20]. 7 000 km^2 corresponds to a circle with a radius of about 25 NM. As a matter of comparison:

(A) the search zone of the Air France flight AF447 was a circle with a radius of 40 NM, totalling 17 000 km^2; and

(B) the area of the search zone of the Malaysian Airlines flight MH370 was 120 000 km2: this corresponds to the area of a circle with a radius of 105 NM The distance covered by an aeroplane cruising at Mach 0.8 in 15 minutes is about 120 NM.

(iii) From this comparison, it comes out that a 15-minute position reporting period would, in the absence of other indication on the location of the aeroplane, result into a search area which is greater than the largest area ever searched by authorities to locate an aircraft wreckage under water. Hence, a 15-minute position reporting period would not facilitate the work of SAR or of investigation authorities.

(3) Implementation aspects

(i) The report of the International Air Transport Association (IATA) Aircraft Tracking Task Force (hereinafter referred to as the 'ATTF report') recommends that the aircraft tracking function 'should report at least every 15 minutes' and an implementation time frame of 12 months. ICAO Annex 6 Part I Standard 3.5.3 also prescribes a position report 'at least every 15 minutes'.

(ii) This is because, as of today, the transmission of a position report every 15 minutes by all aeroplanes having the necessary communication equipage can be met with the capacity of satellite communication providers until about 75 degrees latitude. While it is expected that aircraft tracking using satellites will be successful at even higher latitudes, beyond 75 degrees it might have to be backed up by other channels.

(iii) In the arctic region, several tens of flights are tracked daily using HF data link. Only a few flights are undertaken in the Antarctic region; however, they can also be tracked using HF data link. However, it is not certain that the current performance

[18] For instance, because the ELTs are damaged, immersed, or because the link from the ELT to the ELT antenna is broken.

[19] However, it cannot be assumed that in all cases the aeroplane would be fitted with an 8.8 kHz ULD as required by CAT.IDE.A.285, because this requirement is only applicable if the aeroplane is operated over routes which remain within 180 NM from shores, while CAT.GEN.MPA.205 applies irrespective of the area of operation of the aeroplane. Therefore, an aeroplane operated over or close to continent masses would be included in the aircraft tracking system but it would not be required to carry an 8.8 kHz ULD.

[20] Refer to RIA D, Annex C in NPA 2013-26.

of HF data link communications would allow tracking at shorter time intervals than 15 minutes.

(4) Conclusion

A position reporting period of 15 minutes between successive position reports will, in the short term, provide for an earlier detection of abnormal operation and a better localisation of aeroplanes compared to the current situation, in particular when they are overflying oceanic and remote areas. It is expected that, in the mid-term, global communication providers (satellite, HF data link, etc.) and their distribution partners will have developed an infrastructure capable of supporting an even shorter reporting period for all eligible aeroplanes. However, account should be taken of limitations on which an individual operator has little control (limitation of the ATC surveillance systems when surveillance data is used, limitation inherent to the communication services available to the airborne equipment on currently operated aircraft, etc.). This the reason why paragraph (b) of the proposed AMC1 CAT.GEN.MPA.205 does not specify a more ambitious value than 15 minutes for the position reporting period.

(c) Content of position reports

(1) The minimum content of a position report is the latitude and the longitude of the aeroplane and the time of determination of the aeroplane's position (not the time of reception for recording). In addition, the position report should include an indication of the altitude (for example, pressure altitude or flight level or global navigation satellite system (GNSS) altitude) whenever the latter is available. The altitude information might not always be available depending on the data source, therefore the condition 'whenever available'.

(2) However, in the case of an aeroplane departing, it is considered acceptable that the report only contains data indicating the time at which the aeroplane has left the gate at the departure aerodrome or the time at which the aeroplane has become airborne. Similarly, data indicating the time at which the aeroplane has reached the gate at the destination aerodrome or the time at which it has landed may also be considered as a position report. Indeed, the position of departure and destination aerodromes are obviously known, so that latitude and longitude are not considered necessary for such position reports.

(d) Source (and performance) of position data

The following sources of data are considered acceptable:

— ATC surveillance systems;

— The flight crew, if the planned flight duration is less than two position reporting periods (refer to (a));

— Systems installed on board the aeroplane; or

— Any data source when the position report is just a time-stamped indication that the aeroplane has left the gate at departure, become airborne, landed or reached the gate at arrival (refer to point (c) of AMC1 CAT.GEN.MPA.205).

(1) In the case where position data comes from aeroplane systems:

— An accuracy greater than or equal to 1 NM for the latitude and longitude is recommended by the ATTF report (refer to Appendix 5), but the accuracies provided by the navigation system of the aeroplane are also acceptable. It should be noted that most navigation systems combine data from several inertial reference systems, and localisation is assisted by navaids and GNSS positioning data, therefore they usually achieve an accuracy greater than 1 NM throughout the flight. In addition oceanic airspace blocks usually have a required navigation performance (RNP) accuracy value of 4 (meaning that the aircraft navigation system must be able to calculate its position to within a square with a lateral dimension of 4 nautical miles), or 10 (meaning that the aircraft navigation system must be able to calculate its position to within a square with a lateral dimension of 10 nautical miles). The accuracy of a position report does not need to be greater than the RNP accuracy required for the airspace blocks from which the position report is received.

— An approved GNSS receiver also achieves accuracy of 1 NM for latitude and longitude;

— An accuracy of about 700 ft for the altitude would be sufficient for the purpose of aircraft tracking. 700 ft corresponds to the accuracy required for the pressure altitude parameter when at high altitude (refer to EUROCAE ED-112A[21]). Approved GNSS receivers and most aeroplane navigation systems provide for a greater altitude accuracy. Rules applicable to reduced vertical separation minimum (RVSM) also require an altitude accuracy greater than 700 ft;

— point (d)(3)(i) of AMC1 CAT.GEN.MPA.205 recommends that the source of time, latitude and longitude data be either the navigation system of the aeroplane or an approved GNSS receiver, while point (e)(3(ii) recommends that the source of altitude data be an approved source of pressure altitude, or the same source as for time, longitude and latitude data. In practice, this means that when relying on already approved systems for the source of position data, an operator won't have to demonstrate an accuracy performance.

— Point (d)(3)(iii) recommends that the delivery time of position reports from the aeroplane to the operational control over the flight does not exceed 10 minutes, to the extent possible. According to Regulation (EU) 2015/2338, an aircraft tracking system is a system 'that relies on aircraft tracking in order to identify abnormal flight behaviour and provide alert'. In addition, an aircraft tracking system is 'part of the system for exercising operational control over the flights'. Hence, for an aircraft tracking system to fulfil its objective of early detection and alert, the delay from position determination to reception for recording should be kept within boundaries. A maximum value of 10 minutes for this delay is recommended because it is short enough to allow for quick reaction. Data transmission to the ground usually relies on long-distance communication service providers which are capable of transmitting the data within a few seconds to a few minutes depending on the channel used and other factors.

[21] EUROCAE ED-112A, Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems, dated September 2013.

(2) In the case where position data comes from ATC surveillance systems:

— No accuracy objective is considered because it would be difficult for an aircraft operator to know the accuracy of position data coming from all involved ATC surveillance systems[22];

— ATC surveillance systems are capable of detecting the position of aircraft in a timeframe which is consistent with the purpose of aircraft tracking. SSR and Mode-S radars are locating aeroplanes with an active SSR transponder every 4 to 12 seconds. Even in the case of ADS-C data, the delivery time for surveillance data should be less than 3 minutes (refer to ICAO Doc 9869, Appendix C, subsection 2.1.3).

— However, the delay with which the ATC surveillance data will be made available to operators is not known. Hence, when relying on ATC surveillance data for aircraft tracking, the operator should also check that the delay between detection of the aeroplane position by the ATC surveillance systems and making this aeroplane position available remains less than 10 minutes.

(3) In the case where position data comes from manual reporting by the flight crew:

— a position accuracy objective is not set: indeed, given the speed of a large aeroplane in cruise, it is difficult for a human being to transmit an accurate aeroplane position (typically, at Mach 0.8, an aeroplane covers a distance of 1 NM in about 8 seconds only);

— a delivery time objective is not set, given that the flight crews' primary duties take precedence over reporting the aircraft position.

(e) Temporary lack of aircraft tracking data

(1) In the case some flights cannot be tracked because of an unexpected or a temporary issue, the operation of involved aeroplanes should not be immediately restricted. Indeed, aircraft tracking for the purpose of CAT.GEN.MPA.205 is not essential for the safe conduct of the flight. This is one of the reasons why ICAO Annex 6 Part I Standard 3.5.4 offers the possibility to an operator to obtain 'variations to automated reporting intervals'.

(2) However, the lack of aircraft tracking data should not become recurrent or permanent for an individual aircraft or a given route operated by the operator, otherwise it could not be considered complying with the general requirement that 'flights shall be tracked' (refer to CAT.GEN.MPA.205).

(3) It should be noted that there already exist, in the certification specifications for master minimum equipment lists (CS-MMEL), items for HF communications (item 23-11-1), VHF communications (23-12-1), Datalink (23-20-1). For all these items, the rectification interval category C was specified (items in this category shall be rectified within 10 calendar days, excluding the day of discovery). Generally speaking, given that aircraft tracking for the purpose of CAT.GEN.MPA.205 is not essential for the safe conduct of the flight, category C

[22] The position accuracy provided by a single SSR already depends on many parameters, not to mention the position accuracy provided by ATC surveillance systems merging data from multiple sensors.

seems to be appropriate for airborne equipment supporting the aircraft tracking function.

(4) If the lack of aircraft tracking data is not caused by failure of airborne equipment, which is addressed by the minimum equipment list, a maximum time interval for solving this issue still needs to be defined. A longer time interval is specified in paragraph (f) of AMC1 CAT.GEN.MPA.205, because a lack of aircraft tracking data may also be caused by events for which the operator is not prepared. Examples of such events are:

— failure at the level of the communication service used for aircraft tracking, which affects the transmission of aircraft tracking data; or

— temporary airspace closures that may force unequipped aircraft onto routes requiring aircraft tracking.

(f) Operational control over the flight

The definition of aircraft tracking system in Annex I to Commission Regulation (EU) No 965/2012 includes the detection of 'abnormal flight behaviour', which is explained in GM1 to Annex I (see 3.2.1.3). In addition, it is recommended, in paragraph (g) of AMC1 CAT.GEN.MPA.205, that when abnormal flight behaviour is suspected, this should be checked and acted upon without delay by the aircraft operator. This is because, in both Air France flight AF447 and Malaysian Airlines flight MH370 cases, the long delays taken by the aircraft operators and the ANSPs in triggering an alert contributed to the great difficulties in locating the aeroplane afterwards. Hence, timely reaction to a deviation from normal operation is essential for the aircraft tracking system as a whole to be effective. This notion is made implicit in the definition of aircraft tracking system, which includes the objective 'to identify abnormal flight behaviour and provide alert'. It is also consistent with ICAO Annex 6 Part I, Standard 4.6.1 which prescribes that a flight operations officer 'shall notify the appropriate ATS unit when the position of the aeroplane cannot be determined by an aircraft tracking capability and attempts to establish communications are unsuccessful'.

(g) Recording of aircraft tracking data during normal operation

The recording of all aircraft tracking data for each individual flight is essential for the aircraft tracking system to be effective, in particular for identifying an abnormal flight behaviour. This is addressed by paragraph (h) of AMC1 CAT.GEN.MPA.205, which recommends that:

(1) all aircraft tracking data should be recorded on the ground, including position data from ATC surveillance systems when it is used for aircraft tracking; and

(2) aircraft tracking data is retained at least until confirmation that the flight has been completed and it is uneventful (i.e. no accident or serious incident during the flight).

The recording of aircraft tracking data, like other aircraft tracking processes, may be outsourced. However, according to CAT.GEN.MPA.205, the aircraft operator is ultimately responsible for tracking its flights and this includes the recording of aircraft tracking data.

(h) Preserving aircraft tracking data after an accident or a serious incident

(1) After an accident or a serious incident, the aircraft tracking data of the involved flight needs to be of immediate use by the ANSP responsible for the alerting service and the SAR operations. This is why ICAO Annex 6 Part I, Standard 3.5.5 prescribes that the operator

establishes procedures 'for the retention of aircraft tracking data to assist SAR in determining the last known position of the aircraft'. Therefore, according to paragraph (i) of AMC1 CAT.GEN.MPA.205, the operator should be capable of providing without delay a copy of this data in an electronic format that is human-readable using a common text file editor.

(2) In addition, sufficient time should be granted to authorities (including investigation authorities) to decide on the relevance of recovering aircraft tracking data of the involved flight. This is why paragraph (i) of AMC1 CAT.GEN.MPA.205 also recommends that this aircraft tracking data is retained for at least 30 days.

(i) Procedures

It is recommended, in point (i) of AMC1 CAT.GEN.MPA.205, that procedures be established to describe the aircraft tracking system.

(1) In particular, the procedures should cover the identification of an abnormal flight behaviour and the notification of the competent ATS unit. In this context, it should be noted that ICAO Annex 6 Part I Standard 4.6.1 prescribes that a flight operation officer shall 'notify the appropriate ATS unit when the position of the aeroplane cannot be determined by an aircraft tracking capability and attempts to establish communication are unsuccessful'.

(2) Because these procedures should include the transition from normal to emergency operations, they should be integrated with the operator's emergency response plan. An emergency response plan is recommended for complex and non-complex operators (refer to AMC1 ORO.GEN.200(a)(1);(2);(3);(5) and AMC1 ORO.GEN.200(a)(3)).

(3) With the inclusion of abnormal flight behaviour and the link to the emergency response plan, point (i) of AMC1 CAT.GEN.MPA.205 is considered to address Safety Recommendation ASTL-2017-003 of the Australian Transport Safety Bureau (see Section 2.1).

4.2.1.5 Flights performed in airspace covered by ATS surveillance

AMC2 CAT.GEN.MPA.205 specifies a set of conditions under which it is acceptable to invoke the exception defined by CAT.GEN.MPA.205(b) and not track a flight. In particular:

(a) Trajectory points located at a distance of less than 50 NM from the departure airfield and trajectory points located at a distance of less than 50 NM from the destination airfield may be considered as not part of the 'planned route' designated by CAT.GEN.MPA.205(b). It should be noted that with a slope of the flight path of 5 %, the altitude difference corresponding to a distance on the ground of 50 NM is roughly 15 000 ft. 5 % corresponds to a typical flight path angle during the approach phase or the climb phase.

(b) Trajectory points located at a distance of less than 50 NM from any diversion airfield may be considered as not part of the 'planned diversion routes'.

(c) In the other cases, the ATC surveillance systems should be capable of locating the aeroplane at time intervals of duration not exceeding 15 minutes.

(1) This is consistent with ICAO Annex 6 Part I, Standard 3.5.3 which prescribes aircraft

tracking 'where an ATS unit obtains aeroplane position information at greater than 15 minute intervals'.

(2) In Europe, the coverage by ATC surveillance systems (SSR, Mode-S radars, WAM systems, ADS-B stations) is such that most intra-European flights could benefit from this exception (see Appendix 1). Typically, an SSR or a Mode-S radar covers its area of detection in less than 12 seconds (4 seconds for approach radars and up to 12 seconds for en-route radars). WAM systems and ADS-B stations have configurable refresh periods which usually vary between 1 and 12 seconds.

(3) ATC surveillance systems may also be set up over some oceanic airspace blocks (for instance, assisted by satellite).

(d) The aircraft operator should have evidence that the conditions required for using this exception were checked. In practice, a check should be performed when a new route is operated in airspace so far not used by the operator, and then at regular time intervals. This includes checking that the relevant airspace blocks are still fully covered by ATC surveillance systems. It is recommended, in paragraph (e) of AMC2 CAT.GEN.MPA.205, that this recurrent check be performed at time intervals not exceeding 180 calendar days (that's about 6 months).

4.2.1.6 GM proposed for CAT.GEN.MPA.205

The following GM is proposed for assisting in the implementation of aircraft tracking systems:

(a) Explanation of terms. Two terms are explained in GM1 CAT.GEN.MPA.205 in order to facilitate the correct interpretation of the rule:

(1) Capability to provide a position additional to the SSR transponder

CAT.GEN.MPA.205 is applicable to legacy aeroplanes that are 'already equipped with a capability to provide a position additional to the secondary surveillance radar transponder'. GM1 CAT.GEN.MPA.205 provides guidance on what this capability means in practice. If the aeroplane is carrying equipment other than the SSR transponder, which is operative, and which can be used to automatically transmit position data without change to the approved airborne systems, this equipment should be considered as a capability to provide a position additional to the SSR transponder.

(2) Abnormal flight behaviour

This term appears in the definition of an aircraft tracking system and in AMC1 CAT.GEN.MPA.205. A paragraph is proposed to be added to GM1 to Annex I (Definitions), which describes the conditions under which an event can be qualified 'abnormal flight behaviour' (refer to 2.3.1.3). In order to ensure that the operators are aware, reference is made from GM1 CAT.GEN.MPA.205 to GM1 to Annex I (Definitions).

(b) Determining whether a flight needs to be tracked

GM2 CAT.GEN.MPA.205 contains a table summarising the cases applicable to an aircraft which is of a model subject to the aircraft tracking requirement according to CAT.GEN.MPA.205(a). The purpose is to provide more clarity on when a flight is required to be tracked.

(c) Practical method for assessing when tracking a given flight is needed

GM3 CAT.GEN.MPA.205 provides an example of a method to assess whether flights operated along a given route need to be tracked.

(1) It is not expected to check at every point of the route from the parking stand at the departure airfield to the parking stand at the destination airfield that the conditions defined in CAT.GEN.MPA.205(b)(1) and CAT.GEN.MPA.205(b)(2) are fulfilled. Indeed, according to AMC2 CAT.GEN.MPA.205, trajectory points located at a distance of less than 50 NM from the departure, the arrival or the destination airfields do not need to be considered.

(2) Following this reasoning, it is sufficient to consider the airspace blocks crossed by the planned route and the planned diversion routes: for each airspace block, one needs to determine whether ATS surveillance service is provided, which is supported by ATC surveillance systems and whether the competent ANSP has information sufficient to contact the on-duty staff at the operator.

(3) GM3 CAT.GEN.MPA.205 only offers an example of method. There may be other methods for assessing compliance with the conditions defined in CAT.GEN.MPA.205(b)(1) and CAT.GEN.MPA.205(b)(2).

(d) Summary of possible sources and content for a position report

GM4 contains a table presenting the possible sources and the content of a position report according to AMC1 CAT.GEN.MPA.205. GM4 does not bring any new condition; its purpose is to give a general picture of the choices available to an operator.

(e) Choice of the position reporting period

GM5 CAT.GEN.MPA.205 provides explanations on the influence of the position reporting period on the effectiveness of the aircraft tracking system when there is no additional functionality that may enhance the detection of a deviation from normal operation. These explanations are meant to help in making the right choice when selecting a position reporting period. GM5 CAT.GEN.MPA.205 also includes reference to the final report of the ATSB on the operational search for MH370, and a quote of safety recommendation ASTL-2017-004. This is considered sufficient to address this safety recommendation (see Section 2.1).

(f) Providing contact information to competent air navigation services

In order to invoke the exception of point CAT.GEN.MPA.205(b), it is required to provide contact information to all the competent ANSPs. This ensures that in practice, if an ATS unit considers that an aeroplane is in a state of emergency, it can quickly alert the aircraft operator. One way of doing it is suggested in GM6 CAT.GEN.MPA.205: it consists in systematically inserting such contact information in the ATS flight plan, so that all ATS units that will control the flight on the planned route receive this information.

(g) Further guidance on aircraft tracking

GM7 CAT.GEN.MPA.205 refers to ICAO Circular 347 ‘Aircraft Tracking Implementation Guidelines’ for additional guidance on establishing an aircraft tracking system. It should be noted that CAT.GEN.MPA.205 is not fully aligned with the ICAO Standards addressing aircraft tracking in Annex 6 Part I (see also paragraph 2.3.1.2); for this reason, some of the recommendations of

ICAO Circular 347 might be not relevant for an operator subject to CAT.GEN.MPA.205. Table 1 of Appendix 4 shows the main differences between the Standards addressing aircraft tracking in ICAO Annex 6 Part I and CAT.GEN.MPA.205.

4.2.1.7 Update of GM1 ORO.GEN.110(c)

In point (a) of GM1 ORO.GEN.110(c), the words 'or a full flight watch system' are removed. This is to avoid misinterpretation of CAT.GEN.MPA.205, as indicated by a comment from the Advisory Bodies (see Appendix 1 – CRD to comments received during AB consultation).

(a) Indeed the mention of 'full flight watch system' in GM1 ORO.GEN.110(c) stems from ACJ OPS 1.195 in JAA Temporary Guidance Leaflet 44[23], which was adopted before any requirement on aircraft tracking systems. At that time, it was probably preferable to clarify that 'operational control over the flights' does not imply someone watching aircraft tracks all along the flights.

(b) This mention has become unnecessary, because operational control over the flights is in the meantime a well-understood concept in the industry. In addition, with the introduction of CAT.GEN.MPA.205, the terms 'flight watch system' could be misleading, all the more than no implementing rule, AMC or GM contains any definition or explanation of a 'flight watch system'.

4.2.2 Alternatives to installing a low-frequency ULD

4.2.2.1 Details of the issue to address

(a) Point CAT.IDE.A.285(f) requires some categories of large aeroplanes to be fitted by 1 January 2019 with an 'underwater locating device that operates at a frequency of 8.8 kHz ± 1 kHz'. However, point CAT.IDE.A.285(f)(2) provides an alleviation when the aeroplane is equipped with 'robust and automatic means to accurately determine, following an accident where the aeroplane is severely damaged, the location of the point of end of flight'. Point CAT.IDE.A.285(f)(2) actually refers to CAT.GEN.MPA.210 'Location of an aircraft in distress — aeroplanes', and not to CAT.IDE.A.280 'Emergency locator transmitter (ELT)'. A conventional automatic ELT such as installed on currently operated aeroplanes is primarily designed to work in survivable accidents, while the means considered in CAT.GEN.MPA.210 is 'robust', i.e. it can provide the location of the point of end of flight in survivable accident scenarios as well as in non-survivable accident scenarios. Therefore, a conventional automatic ELT cannot be used to obtain alleviation from installing a low frequency ULD under point CAT.IDE.A.285(f)(2).

(b) No AMC has been issued to this date for CAT.GEN.MPA.210. This is because:

— CAT.GEN.MPA.210 is only applicable to aeroplanes manufactured on or after 1 January 2021; and

— the solutions expected to comply with CAT.GEN.MPA.210 are not commercially available yet (those are, for instance, an automatic deployable flight recorder or a system capable of triggering the ELT upon automatic detection of an emergency situation).

(c) Hence, in practice, aeroplanes which are within the scope of point CAT.IDE.A.285(f) and which are operated over routes going farther than 180 NM from the shore will have to be fitted with an 8.8 kHz ULD by 1 January 2019.

[23] JAA Administrative & Guidance Material, Section Four: Operations, Part Three: Temporary Guidance Leaflet (JAR-OPS), leaflet No 44

4.2.2.2 GM proposed for CAT.IDE.A.285

(a) GM1 CAT.IDE.A.285(f)(2) provides the necessary explanation for correctly interpreting point CAT.IDE.A.285(f)(2). This GM indicates that point CAT.IDE.A.285 (f)(2) refers to CAT.GEN.MPA.210 and not to a conventional automatic ELT (such as required by CAT.IDE.A.280).

In addition, GM1 CAT.IDE.A.285(f)(2) explains the meaning of the adjective 'robust': this indicates that the means will also provide the location of the point of end of flight in non-survivable accident scenarios (e.g. when the aircraft is completely destroyed by the crash impact). By comparison, an automatic ELT which just complies with ETSO-C126a (406 MHz Emergency Locator Transmitter) is not designed to successfully transmit in case of a non-survivable accident, because ETSO-C126a refers to EUROCAE ED-62A[24], and one of the assumptions in the latter document is that the mission of an ELT is to facilitate SAR, in the case where someone may have survived the accident.

4.3. Appendix 3 — Airspace blocks in Europe and air traffic surveillance sensors

This Appendix contains maps that have been prepared by EUROCONTROL and which show the overall organisation of the upper airspace in the European area and the coverage by ATC surveillance systems.

The maps illustrate the excellent coverage of the airspace by SSR and mode-S radar. Because of this, most flights operated inside the European area with aeroplanes with an MCTOM of over 27 000 kg (which typically cruise at an altitude of 30 000 ft or higher) could fulfil the conditions for the exception provided by point CAT.GEN.MPA.205(b) (i.e. rely on the tracking and alerting functions performed by ANSPs).

Map 1 shows the organisation of flight information regions (FIRs) and upper information regions (UIRs) in the European area as of 2 February 2017.

Map 2 shows the coverage of the European region by SSRs and Mode-S radars of the 41 Member States of EUROCONTROL[25] and Iceland at an altitude of 15 000 ft, as well the limits of the flight information regions (source: EUROCONTROL, 14 September 2017).

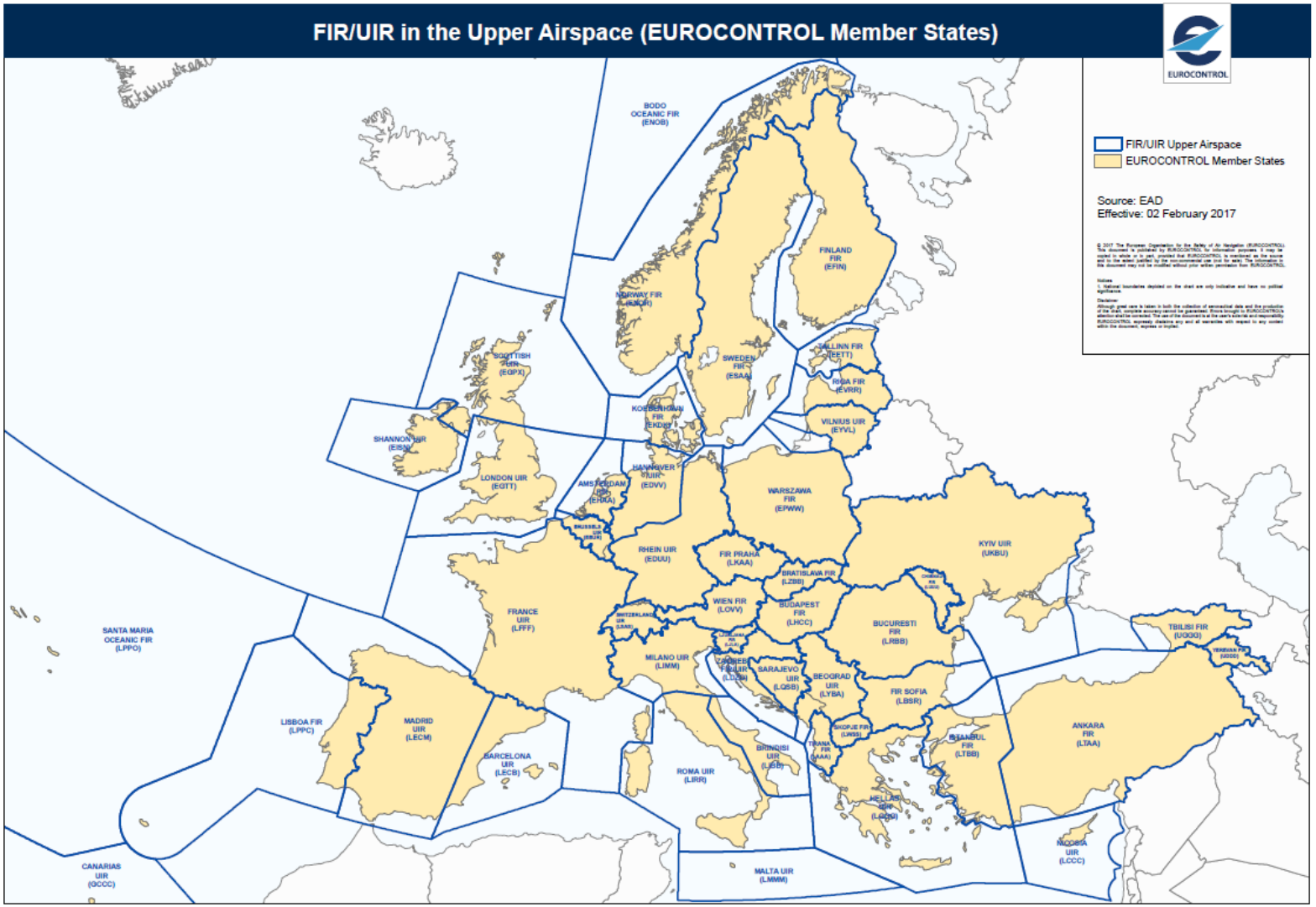
Map 3 shows the coverage of the European region by SSRs and Mode-S radars of the 41 Member States of EUROCONTROL and Iceland at an altitude of 30 000 ft, as well the limits of the flight information regions (source: EUROCONTROL, 14 September 2017).

In both maps 2 and 3, the coverage overlap redundancy (considering the coverage which has been allocated) is shown with colours.

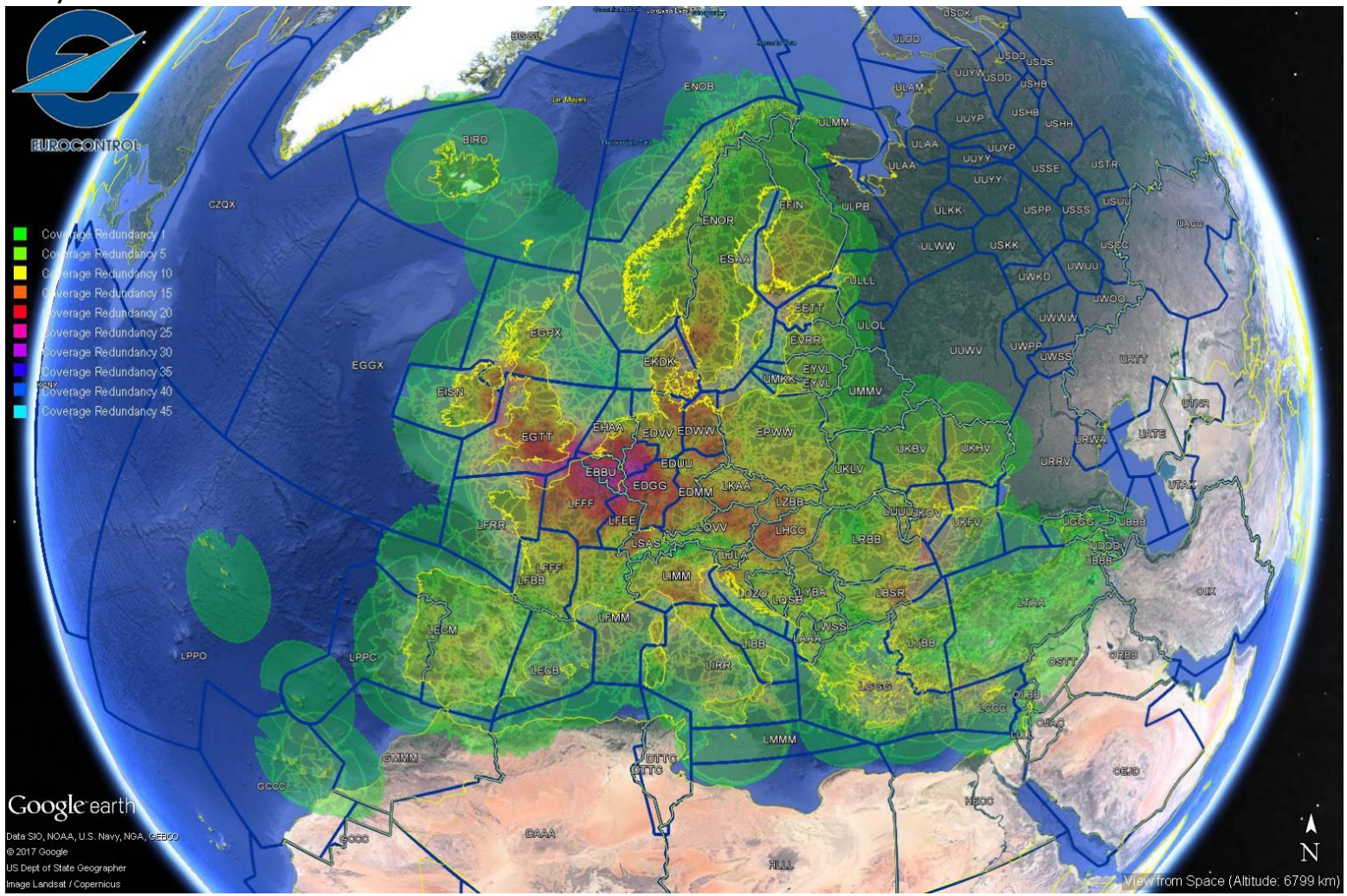
[24] EUROCAE ED-62A, Minimum Operational Performance Specification for Aircraft Emergency Locator Transmitters 406 MHz and 121.5 MHz (Optional 243 MHz), dated February 2009.

[25] Member States of EUROCONTROL can be consulted at https://www.eurocontrol.int/about/member-states .

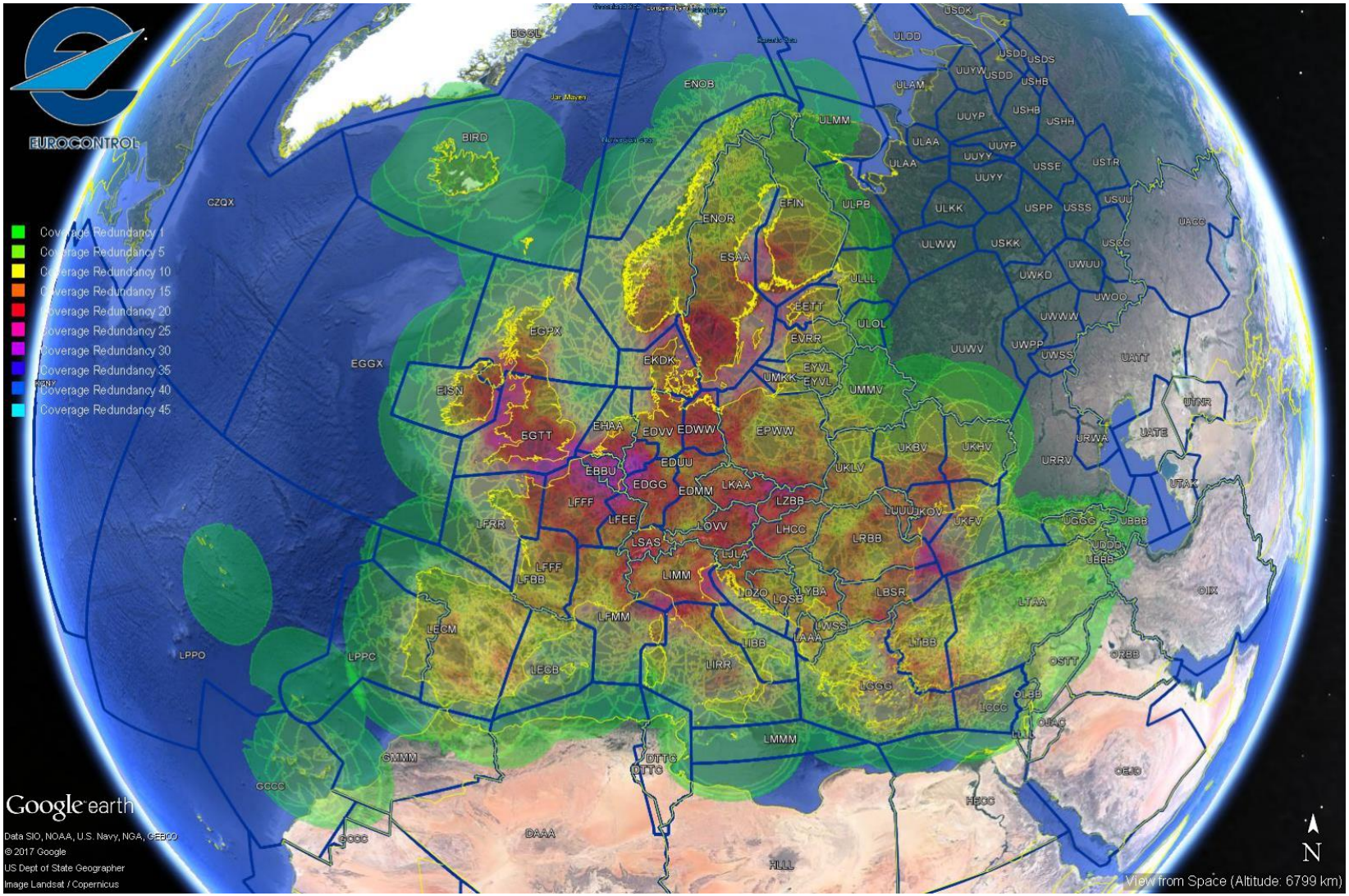
Map 1: FIRs and UIRs in the European area (2 February 2017) — source: EUROCONTROL



Map 2: Coverage at 15 000 ft above sea level (ASL) of SSR and Mode-S radars of EUROCONTROL Member States — source: EUROCONTROL (September 2017)



Map 3: Coverage at 30 000 ft ASL of SSR and Mode-S radars of EUROCONTROL Member States — source: EUROCONTROL (September 2017)



4.4. Appendix 4— Implementation of ICAO Standards related to aircraft tracking

Table 1 presents the main differences between the Standards addressing aircraft tracking in ICAO Annex 6 Part I and the requirements under CAT.GEN.MPA.205. These differences cannot be 'corrected' by AMC and GM, they are just presented for the readers' awareness.

Table 2 presents a comparison between the SARPs related to aircraft tracking in ICAO Annex 6 Part I on the one hand, and CAT.GEN.MPA.205 and its AMC/GM on the other hand.

Table 1: Main differences between Standards in ICAO Annex 6 Part I and CAT.GEN.MPA.205

Aspect considered	ICAO Standards	CAT.GEN.MPA.205
Aircraft tracking capability	According to Annex 6 Part I, 3.5.1, an aircraft tracking capability is required for all operators performing international CAT with aeroplanes	An aircraft tracking capability is not required for all operators performing CAT with aeroplanes.
Currently operated aeroplanes	Annex 6 Part I, 3.5.1 to 3.5.5 are applicable to currently operated aeroplanes.	Among the aeroplanes first issued with an individual CofA before 16 December 2018, only those which are currently 'equipped with a capability to provide a position additional to the secondary surveillance radar transponder' may be subject to the aircraft tracking requirement.
Mass category	The following aircraft models are subject to the aircraft tracking requirement according to Annex 6 Part I, 3.5.3: • Aeroplanes with an MCTOM of more than 45 500 kg and a seating capacity greater than 19. Note: Annex 6 Part I, 3.5.2 recommends aircraft tracking for aeroplanes with an MCTOM of more than 27 000 kg and a seating capacity greater than 19 (Annex 6 Part I, 3.5.2 is a recommended practice).	The following aircraft models are subject to the aircraft tracking requirement: • Aeroplanes with an MOPSC of more than 19 and an MCTOM of more than 27 000 kg, and • Aeroplanes with an MOPSC of more than 45 500 kg (whatever the MOPSC).
Where to track	Annex 6 Part 1, 3.5.3 only requires tracking for the portion of the in-flight operation(s): • 'which is planned in an oceanic area(s)', and • where 'an ATS unit obtains aeroplane position information at greater than 15 minute intervals' Note: Annex 6 Part I, 3.5.2 recommends aircraft tracking in all areas where an ATS unit obtains aeroplane position information at greater than 15 minutes interval (Annex 6 Part I, 3.5.2 is a recommended practice).	Flights shall be tracked by the operator 'from take-off to landing' except when the planned route and the planned diversion routes are fully included in airspace blocks where: • ATS surveillance service is normally provided which is supported by ATC surveillance systems locating the aircraft; and • the operator has provided to the competent ANSPs the necessary contact information.

Table 2: Comparison between the ICAO SARPs related to aircraft tracking and CAT.GEN.MPA.205 and AMC/GM to CAT.GEN.MPA.205

Text of the Standard or the Recommended Practice (RP) adopted in Annex 6 Part I	Status of the SARP	Text of the corresponding points in the IRs and AMC	Comments
CHAPTER 1. DEFINITIONS		Annex I to Regulation (EU) No 965/2012 (Definitions)	
Aircraft tracking. A process, established by the operator, that maintains and updates, at standardized intervals, a ground-based record of the four dimensional position of individual aircraft in flight.	Published	(8a) 'aircraft tracking' means a ground based process that maintains and updates, at standardised intervals, a record of the four dimensional position of individual aircraft in flight; (8b) 'aircraft tracking system' means a system that relies on aircraft tracking in order to identify abnormal flight behaviour and provide alert;	The EU rules for air operations contains an additional definition for an aircraft tracking system.
CHAPTER 3. GENERAL, 3.5 Aircraft tracking (Applicable on and after 8 November 2018)		Annex IV to Regulation (EU) No 965/2012 (Part-CAT)	
3.5.1 The operator shall establish an aircraft tracking capability to track aeroplanes throughout its area of operations.	Published	**CAT.GEN.MPA.205 Aircraft tracking system - Aeroplanes** (a) By 16 December 2018 at the latest, the operator shall establish and maintain, as part of the system for exercising operational control over the flights, an aircraft tracking system, which includes the flights eligible to (b) when performed with the following aeroplanes: (1) aeroplanes with an MCTOM of more than 27 000 kg, with an MOPSC of more than 19, and first issued with an individual CofA before 16 December 2018, which are equipped with a capability to provide a position additional to the secondary surveillance radar transponder; (2) all aeroplanes with an MCTOM of more than 27 000 kg, with an MOPSC of more than 19, and first issued with an individual CofA on or after 16 December 2018; and (3) all aeroplanes with an MCTOM of more than 45 500 kg and first issued with an	Standard 3.5.1 is applicable to all aeroplanes within the scope of Annex 6 Part I (including lighter aeroplanes), while CAT.GEN.MPA.205 only requires aircraft tracking for flights performed by aeroplanes with an MCTOM of more than 27 000 kg and with an MOPSC of more than 19, and aeroplanes with an MCTOM of more than 45 500 kg.

		individual CofA on or after 16 December 2018. …'	
3.5.2 **Recommendation**.— *The operator should track the position of an aeroplane through automated reporting at least every 15 minutes for the portion(s) of the inflight operation(s) under the following conditions:* *a) the aeroplane has a maximum certificated take-off mass of over 27 000 kg and a seating capacity greater than 19; and* *b) where an ATS unit obtains aeroplane position information at greater than 15 minute intervals.* *Note.— See Annex 11 Chapter 2 for coordination between the operator and air traffic services provisions regarding position report messages*. 3.5.3 The operator shall track the position of an aeroplane through automated reporting at least every 15 minutes for the portion(s) of the inflight operation(s) that is planned in an oceanic area(s) under the following conditions: a) the aeroplane has a maximum certificated take-off mass of over 45 500 kg and a seating capacity greater than 19; and b) where an ATS unit obtains aeroplane position information at greater than 15 minute intervals.	Published	**CAT.GEN.MPA.205 Aircraft tracking system — Aeroplanes** (a) By 16 December 2018 at the latest, the operator shall establish and maintain, as part of the system for exercising operational control over the flights, an aircraft tracking system, which includes the flights eligible to (b) when performed with the following aeroplanes: (1) aeroplanes with an MCTOM of more than 27 000 kg, with an MOPSC of more than 19, and first issued with an individual CofA before 16 December 2018, which are equipped with a capability to provide a position additional to the secondary surveillance radar transponder; (2) all aeroplanes with an MCTOM of more than 27 000 kg, with an MOPSC of more than 19, and first issued with an individual CofA on or after 16 December 2018; and (3) all aeroplanes with an MCTOM of more than 45 500 kg and first issued with an individual CofA on or after 16 December 2018. (b) Flights shall be tracked by the operator from take-off to landing except when the planned route and the planned diversion routes are fully included in airspace blocks where: (1) ATS surveillance service is normally provided which is supported by ATC surveillance systems locating the aircraft at time intervals with adequate duration; and	Standard 3.5.3 and RP 3.5.2 are applicable to currently operated aeroplanes, while CAT.GEN.MPA.205 is applicable only to currently operated aeroplanes which are equipped with a position reporting capability additional to the transponder. The MCTOM and MOPSC categories of aeroplanes subject to the aircraft tracking requirement in Standard 3.5.3 and RP 3.5.2 are different from those in CAT.GEN.MPA.205. Unlike Standard 3.5.2 and RP 3.5.3, CAT.GEN.MPA.205 requires that flights are tracked 'from take-off to landing' (unless the planned route and planned diversion route are fully covered by ATC surveillance). However, the aircraft tracking data may come from ATC surveillance systems, as specified in paragraph (d) of AMC1 CAT.GEN.MPA.205. The need for reporting to be automated and the duration of maximum time interval

		(2) the operator has provided to competent air navigation service providers necessary contact information' **AMC1 CAT.GEN.MPA.205 Aircraft tracking system — Aeroplanes** (a) Automatic tracking of aeroplane position The aircraft tracking system should rely on equipment capable of automatically detecting and transmitting a position report to the aircraft operator, except if (d)(2) applies. (b) Position reporting period The tracking of an individual flight should provide a position report at time intervals which do not exceed 15 minutes. (...) (d) Sources of position data The data contained in a position report may come from: (1) ATC surveillance systems (…); (2) the flight crew, if the planned flight duration is less than two position reporting periods; (3) aeroplane systems. (…); or (4) any data when the position report is of a type designated by(c)(1), (c)(2), (c)(3) or (c)(4)… '	between two position reports is stated in Standard 3.5.3. These conditions, which are not defined in CAT.GEN.MPA.205, are specified in AMC1 CAT.GEN.MPA.205 (paragraphs (a) and (b)).
3.5.4 Notwithstanding the provisions in 3.5.2 and 3.5.3, the State of the operator may, based on the results of an approved risk assessment process implemented by the operator, allow for variations to automated reporting intervals. The process shall demonstrate how risks to the operation resulting from such variations can be managed	Adopted by ICAO Council for inclusion in Amendment 42 of Annex 6 Part I (refer to State Letter AN	**AMC1 CAT.GEN.MPA.205 Aircraft tracking system — Aeroplanes** EQUIPMENT, PERFORMANCE AND PROCEDURES WHEN AIRCRAFT TRACKING IS REQUIRED (a) Automatic tracking of aeroplane position The aircraft tracking system should rely on	There is no equivalent to Standard 3.5.4 in the EU rules for air operations. However, AMC1 CAT.GEN.MPA.205 introduces flexibility on several

and shall include at least the following: a) capability of the operator's operational control systems and processes, including those for contacting ATS units; b) overall capability of the aeroplane and its systems; c) available means to determine the position of, and communicate with, the aeroplane; d) frequency and duration of gaps in automated reporting; e) human factors consequences resulting from changes to flight crew procedures; and f) specific mitigation measures and contingency procedures.	11/1.3.31-17/20 of 24 March 2017)	equipment capable of automatically detecting and transmitting a position report to the aircraft operator, except if (d)(2) applies. (…) (d) Content of position reports Each position report should contain the latitude, the longitude and the time of position determination and whenever available, an indication of the aeroplane altitude, except that for each flight: (1) One of the position reports may contain only time-stamped data indicating that the aeroplane has left the gate; (2) One of the position reports may contain only time-stamped data indicating that the aeroplane has become airborne; (3) One of the position reports may contain only time-stamped data indicating that the aeroplane has landed; and (4) One of the position reports may contain only time-stamped data indicating that the aeroplane has reached the gate. (…) (e) Temporary lack of aircraft tracking data Aircraft tracking data may be incomplete due to a temporary or unexpected issue prior to or during the flight. However, the operator should: (1) identify any loss of aircraft tracking data which is not due to a temporary issue, and (2) address any systematic lack of aircraft tracking data affecting a given aeroplane or a given route in a timely manner.	aspects: — if the planned flight duration is less than twice the position reporting period, manual transmission of the aircraft position by the flight crew is acceptable; — Some position reports may just contain time-stamped data indicating that the aeroplane is leaving the departure gate, taking off, landing or reaching the destination gate; — a position report may not contain the altitude if it is not available; — aircraft tracking data may be missing due to a temporary or unexpected issue;

3.5.5 The operator shall establish procedures, approved by the State of the Operator, for the retention of aircraft tracking data to assist SAR in determining the last known position of the aircraft.	Published	**AMC1 CAT.GEN.MPA.205 Aircraft tracking system – Aeroplanes** (…) (g) Recording of aircraft tracking data during normal operation When the tracking of a flight is required, all related aircraft tracking data should be recorded on the ground, including position data from ATC surveillance systems when they are used. The aircraft tracking data of a given flight should be retained until confirmation that the flight is completed and no accident or serious incident occurred. (h) Preserving aircraft tracking data after an accident or a serious incident Following an accident or a serious incident, the operator should retain the aircraft tracking data of the involved flight for at least 30 days. In addition, the operator should be capable of providing a copy of this data without delay and in an electronic format that is human-readable using a common text file editor.	AMC1 CAT.GEN.MPA.205 defines principles for the retention of aircraft tracking data during normal operation (paragraph (g)) as well as after an accident or a serious incident (paragraph (h))
CHAPTER 4. FLIGHT OPERATIONS, 4.6 Duties of flight operations officer/flight dispatcher			
4.6.1 A flight operations officer/flight dispatcher in conjunction with a method of control and supervision of flight operations in accordance with 4.2.1.3 shall: .(…) d) notify the appropriate ATS unit when the position of the aeroplane cannot be determined by an aircraft tracking capability and attempts to establish	Published	**CAT.GEN.MPA.205 Aircraft tracking system - Aeroplanes** (a) By 16 December 2018 at the latest, the operator shall establish and maintain, as part of the system for exercising operational control over the flights, an aircraft tracking system … **AMC1 CAT.GEN.MPA.205 Aircraft tracking system – Aeroplanes**	CAT.GEN.MPA.205 requires that the aircraft tracking system is included in the operational control over the flight. AMC1 CAT.GEN.MPA.205 addresses the practical aspects of it, i.e. human monitoring of

communication are unsuccessful.		(…) (f) Operational control over the flights When abnormal flight behaviour is suspected, this should be checked and acted upon without delay. (…) (i) Procedures The operator should establish procedures describing its aircraft tracking system, including the identification of abnormal flight behaviour and the notification of the competent ATS unit when appropriate. These procedures should be integrated with the emergency response plan of the operator.	aircraft tracks at the operator (paragraph (f)) and procedures (paragraph (j))

4.5. Appendix 5 — Performance criteria recommended by the aircraft tracking task force

Table 1 presents a comparison between the aircraft tracking performance criteria proposed in the ATTF report and the AMC to CAT.GEN.MPA.205.

Note: when the criteria recommended by the ATTF report are addressed by CAT.GEN.MPA.205, the indication 'Addressed in the implementing rule' is provided in the Comments column.

Table 1: Comparison between the performance criteria recommended by ATTF and the AMC to CAT.GEN.MPA.205

Performance criteria of the ATTF report, Chapter VI	Corresponding recommendation in AMC/GM to CAT.GEN.MPA.205	Comments
1. The aircraft tracking function should track aircraft within potential areas of operation and range.		Addressed in the implementing rule.
2. The aircraft tracking function should be available and operating while the aircraft is airborne.		Addressed in the implementing rule.
3. The information required for aircraft tracking should include the aircraft 4D position (latitude, longitude, altitude and time) and aircraft identification.	Paragraph (c) of AMC1 CAT.GEN.MPA.205: Content of position reports Each position report should contain the latitude, the longitude and the time of position determination and whenever available, an indication of the aeroplane altitude, except that for each flight: (1) One of the position reports may contain only time-stamped data indicating that the aeroplane has left the gate; (2) One of the position reports may contain only time-stamped data indicating that the aeroplane has become airborne; (3) One of the position reports may contain only time-stamped data indicating that the aeroplane has landed; and (4) One of the position reports may contain only time-stamped data indicating that the aeroplane has reached the gate.	For some areas and/or some data transmission solutions, the altitude information might be not available, therefore paragraph (c) recommends to record 'whenever available, an indication of the aeroplane altitude'. In addition, the position reports at the departure and arrival airfields may just contain time-stamped data indicating that the aeroplane has left the departure gate, taken off, landed or reached the destination gate; in such cases, the position of the aeroplane is the position of the aerodrome, which is known.

4. When transmitted by the aircraft, the tracking accuracy of the position report should be at least 1 NM or better depending on the aircraft's navigation system capability.	Paragraph (d) of AMC1 CAT.GEN.MPA.205: '(e) Sources of position data The data contained in a position report may come from: (1) ATC surveillance systems (…); (2) the flight crew, if the planned flight duration is less than two position reporting periods; (3) aeroplane systems. In that case: (i) the source of time, latitude and longitude data should be the navigation system of the aeroplane or an approved GNSS receiver; and (ii) the source of altitude data should be: (A) the same source as for time, latitude and longitude data, or (B) an approved source of pressure altitude….'	If the source of position data is ATC surveillance systems or an entry made by the flight crew, an accuracy of 1 NM cannot be demonstrated. If the source of position data is an aeroplane system, then relying on an approved system (such as an approved GNSS receiver, an approved source of pressure altitude or the navigation system of the aeroplane) is considered sufficient to address the accuracy objective.
5 (first part). The aircraft tracking function should report at least every 15 minutes.	Paragraph (b) of AMC1 CAT.GEN.MPA.205: '(b) Position reporting period The tracking of an individual flight should provide a position report at time intervals which do not exceed 15 minutes.'	Time intervals shorter than 15 minutes may be advisable. GM5 CAT.GEN.MPA.205 gives explanations.
5. (second part) In airspace where ATS surveillance services or ADS-C identifies the position of the aircraft at least every 15 minutes, the aircraft operator may rely on that system for tracking information	Paragraphs (c) to (e) of AMC2 CAT.GEN.MPA.205: '(c) An ATS surveillance service may be considered 'supported by ATC surveillance systems locating the aircraft at time intervals with adequate duration' if those ATC surveillance systems are capable of locating aircraft at time intervals not exceeding 15 minutes when operated normally. (d) When applicable, the operator	AMC2 CAT.GEN.MPA.205 specifies conditions which should be fulfilled if an operator would like to invoke the exception provided by point CAT.GEN.MPA.205(b). Note:

	should check that the conditions required for using the exception defined by CAT.GEN.MPA.205(b) are fulfilled before operating into new airspace blocks (e) When applicable, the operator should check at time intervals not exceeding 180 calendar days that the conditions required for using the exception defined by CAT.GEN.MPA.205(b) are maintained.' Paragraph (d) of AMC1 CAT.GEN.MPA.205: '(e) Sources of position data The data contained in a position report may come from: (1) ATC surveillance systems (…); (2) the flight crew, if (…); or (3) aeroplane systems. In that case…'	Sub-paragraph (d)(1) of AMC1 CAT.GEN.MPA.205 is a flexibility provision different from that of point CAT.GEN.MPA.205(b). Sub-paragraph (d)(1) of AMC1 CAT.GEN.MPA.205 can be used for any flight that must be tracked. It allows relying partly on position data from ATC surveillance systems for tracking a given flight.
6. The aircraft tracking system should have the ability to increase its reporting rate based on established triggering parameters		The increase of reporting rate is meant to address the need for more accurate localisation data in case of an abnormal flight behaviour. GM5 CAT.GEN.MPA.205 provides explanations and advice regarding the choice of the position reporting period. However, this ATTF recommendation was not transposed into an AMC.
7. A communications protocol must exist between the airline and the air traffic service unit to facilitate coordination during the alert phase of an event that may be detected through aircraft tracking	Paragraph (i) of AMC1 CAT.GEN.MPA.205: '(i) Procedures The operator should establish procedures describing its aircraft tracking system, including the identification of abnormal flight behaviour and the notification of the competent ATS unit when appropriate. These procedures should be integrated with the emergency response plan of the operator.'	AMC1 CAT.GEN.MPA.205 only addresses the requirements on the operator, because the requirements on ATS are outside the scope of CAT.GEN.MPA.205. However, according to Annex II to Commission Implementing Regulation (EU) No 1035/2011 laying down requirements for the provision of air navigation services, ANSPs of European Union Member States shall comply with the Standards of ICAO Annex 11. In particular, Chapter 5 of Annex 11 contains the following Standards:

		'5.5 Information to the operator 5.5.1 When an area control or a flight information centre decides that an aircraft is in the uncertainty or the alert phase, it shall, when practicable, advise the operator prior to notifying the rescue coordination centre. (…) 5.5.2 All information notified to the rescue coordination centre by an area control or flight information centre shall, whenever practicable, also be communicated, without delay, to the operator.'
8. Operators who receive tracking information directly from the aircraft should ensure that procedures are in place to address instances where required reporting does not occur	Paragraphs (f) and (i) of AMC1 CAT.GEN.MPA.205: '(f) Operational control over the flights When abnormal flight behaviour is suspected, this should be checked and acted upon without delay. (…) (i) Procedures The operator should establish procedures describing its aircraft tracking system, including the identification of abnormal flight behaviour and the notification of the competent ATS unit when appropriate. These procedures should be integrated with the emergency response plan of the operator.'	'Abnormal flight behaviour' is part of the definition of an aircraft tracking system provided in Annex I to Commission Regulation (EU) No 965/2012 (Definitions) An explanation of 'abnormal flight behaviour' is provided in GM1 to Annex I.
9. Any new airborne equipment or modification to existing equipment shall meet the appropriate airworthiness requirements	'(d) Sources of position data The data contained in a position report may come from: (1) ATC surveillance systems (…); (2) the flight crew if (…); (3) aeroplane systems. In that case: (i) the source of time, latitude and longitude data should be the navigation system of the aeroplane or an	Paragraph (d) of AMC1 CAT.GEN.MPA.205 recommends that when the source of the position data is an aeroplane system, this system should be approved. Note: According to Part-CAT, Subpart D, Section I, CAT.IDE.A.100 'Instruments and equipment — general': Instruments and equipment

	approved GNSS receiver; (ii) the source of altitude data should be: (A) the same source as for time, latitude and longitude data, or (B) an approved source of pressure altitude. (4) any data source when the position report is of a type designated by (c)(1), (c)(2), (c)(3) or (c)(4)...'	required by this Subpart shall be approved in accordance with the applicable airworthiness requirements (…) Instruments and equipment not required by this Subpart that do not need to be approved in accordance with the applicable airworthiness requirements, but are carried on a flight, shall comply with the following: the information provided by these instruments (…) the instruments and equipment shall not affect the airworthiness of the aeroplane, even in the case of failures or malfunction.'