



European Aviation Safety Agency – Rulemaking Directorate
Notice of Proposed Amendment 2014-14

Portable electronic devices II
RMT.0637 – 24.06.2014

EXECUTIVE SUMMARY

This Notice of Proposed Amendment (NPA) addresses a regulatory issue related to portable electronic devices (PEDs). There is no safety recommendation linked to this rulemaking task.

The specific objective of this proposal is to enable the expanded use of PEDs during various phases of flight by reviewing and updating the operational provisions related to the PED policy.

This NPA proposes to amend the Acceptable Means of Compliance (AMC) and Guidance Material (GM) by adhering to the following approach:

1. The operator has to ensure that PEDs have no negative impact on the safe operation of the aircraft, i.e. the operator has to demonstrate that PEDs do not interfere with on-board electronic systems and equipment.
2. In accordance with 1., the use of PEDs may be granted under the responsibility of the operator, i.e. the operator decides which PED may be used during which phases of the flight.

The proposed changes are expected to establish a more reasonable and more passenger friendly framework for the use of PEDs. These changes will give operators reliable tools to mitigate PED-related risks and hazards, and, therefore, are expected to maintain a high uniform level of safety during all phases of flight.

Applicability		Process map	
Affected regulations and decisions:	ED Decisions 2013/021/R (Part-NCC), 2014/015/R (Part-CAT), 2014/016/R (Part-NCO) and 2014/018/R (Part-SPO)	Concept Paper:	No
Affected stakeholders:	Operators, NAAs	Terms of Reference:	6.4.2014
Driver/origin:	European Commission	Rulemaking group:	No
Reference:	EASA Safety Information Bulletin 2013-21	RIA type:	Light
		Technical consultation during NPA drafting:	No
		Duration of NPA consultation:	6 weeks
		Review group:	TBD
		Focused consultation:	TBD
		Publication date of the Opinion:	N/A
		Publication date of the Decision:	2014/Q3

Table of contents

1. Procedural information	3
1.1. The rule development procedure	3
1.2. The structure of this NPA and related documents	3
1.3. How to comment on this NPA.....	3
1.4. The next steps in the procedure	3
2. Explanatory Note	4
2.1. Overview of the issues to be addressed.....	4
2.2. Objectives	5
2.3. Summary of the Regulatory Impact Assessment (RIA)	5
2.4. Overview of the proposed amendments	6
3. Proposed amendments	10
3.1. Draft Acceptable Means of Compliance and Guidance Material (Draft EASA Decision)	10
4. Regulatory Impact Assessment (RIA)	38
4.1. Issues to be addressed	38
4.1.1. Safety risk assessment	38
4.1.2. Who is affected?	39
4.1.3. How could the issue/problem evolve?	39
4.2. Objectives	39
4.3. Policy options	39
4.4. Analysis of impacts.....	39
4.4.1. Safety impact	39
4.4.2. Environmental impact.....	40
4.4.3. Social impact.....	40
4.4.4. Economic impact.....	40
4.4.5. General aviation and proportionality issues.....	40
4.4.6. Impact on 'Better Regulation' and harmonisation	40
4.5. Comparison and conclusion	41
5. References	42
5.1. Affected regulations.....	42
5.2. Affected AMC and GM	42
5.3. Reference documents	42

1. Procedural information

1.1. The rule development procedure

The European Aviation Safety Agency (hereinafter referred to as the 'Agency') developed this Notice of Proposed Amendment (NPA) in line with Regulation (EC) No 216/2008¹ (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure².

This rulemaking task is included in the Agency's 4-year Rulemaking Programme under RMT.0637.

The text of this NPA has been developed by the Agency. It is hereby submitted for consultation of all interested parties³.

The process map on the title page contains the major milestones of this rulemaking activity to date and provides an outlook of the timescale of the next steps.

1.2. The structure of this NPA and related documents

Chapter 1 of this NPA contains the procedural information related to this task. Chapter 2 (Explanatory Note) explains the core technical content. Chapter 3 contains the proposed text for the new provisions. Chapter 4 contains the Regulatory Impact Assessment showing which options were considered and what impacts were identified, thereby providing the detailed justification for this NPA.

1.3. How to comment on this NPA

Please submit your comments using the automated **Comment-Response Tool (CRT)** available at <http://hub.easa.europa.eu/crt/>⁴.

The deadline for submission of comments is **5 August 2014**.

1.4. The next steps in the procedure

Following the closing of the NPA public consultation period, the Agency will review all comments. The outcome of the NPA public consultation will be reflected in the respective Comment-Response Document (CRD). The Agency will publish the CRD with the Executive Director (ED) Decision containing Acceptable Means of Compliance (AMC) and Guidance Material (GM).

¹ Regulation (EC) No 216/2008 of the European Parliament and 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), as last amended by Commission Regulation (EU) No 6/2013 of 8 January 2013 (OJ L 4, 9.1.2013, p. 34).

² The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as the 'Rulemaking Procedure'. See Management Board Decision concerning the procedure to be applied by the Agency for the issuing of Opinions, Certification Specifications and Guidance Material (Rulemaking Procedure), EASA MB Decision No 01-2012 of 13 March 2012.

³ In accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

⁴ In case of technical problems, please contact the CRT webmaster (crt@easa.europa.eu).

2. Explanatory Note

2.1. Overview of the issues to be addressed

Portable electronic devices (PEDs) are any kind of electronic devices brought on board the aircraft by crew members, passengers or as part of the cargo, and that are not included in the approved aircraft configuration. The use of PEDs on board the aircraft, either by crew members and passengers or included in the cargo, presents a source of uncontrolled electromagnetic emission with potential risk of adverse interference effects to aircraft systems.

PEDs fall into two main categories: non-intentional transmitters and intentional transmitters (or T-PEDs). The first category includes, but is not limited to, calculators, cameras, radio receivers, audio and video players, electronic games and toys. Intentional transmitters are transmitting devices such as remote control equipment (which may include some toys), two-way radios, mobile phones of any type, satellite phones, tablet and laptop computers, e-readers, Global Navigation Satellite System (GNSS) cargo tracking devices and others. For both categories, these devices may assist crew members in their duties or be used for medical purposes.

Commission Regulation (EU) No 965/2012⁵ and its amendments, Commission Regulations (EU) No 800/2013 and 379/2014 make it the operators' responsibility to demonstrate that any PED use on-board is safe and does not affect adversely the performance of the aircraft systems and equipment. Associated AMC and GM for CAT and NCC operations contain detailed considerations and give reference to technical standards. GM to Part-NCO and Part-SPO include explanations of terms and general considerations to be observed.

The Agency is reviewing the PED policy, recognising the wide proliferation of PEDs and the wish of passengers to use them everywhere and at any time, as well as accounting for new certification standards.

In September 2013 the FAA Aviation Rulemaking Committee (ARC) on PEDs made recommendations and provided guidance on allowing additional PED use without compromising the continued safe operation of the aircraft⁶. The ARC report recommends the expanded use of PEDs on board the aircraft during all phases of flight. As a result, the FAA released the document 'Information for Operators – InFO 13010' in October 2013⁷, containing provisions for expanding the allowance of PED use throughout various phases of flight. In addition, as a supplement to InFO 13010, the FAA published the 'FAA aid to operator for the expanded use of passenger PEDs'⁸.

The Agency, as a first step, amended AMC1 CAT.GEN.MPA.140⁹, containing provisions on the expanded use of PEDs. Transmitting devices were not part of this first step. In

⁵ 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), as last amended by Commission Regulation (EU) No 379/2014 of 7 April 2014 (OJ L 123, 24.4.2014, p. 1).

⁶ http://www.faa.gov/about/initiatives/ped/media/PED_ARC_FINAL_REPORT.pdf.

⁷ http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/media/2013/InFO13010.pdf.

⁸ http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/media/2013/InFO13010SUP.pdf.

⁹ ED 2013/028/R, dated 26 November 2013; in the meantime superseded by ED Decision 2014/015/R.

addition, the Safety Information Bulletin (SIB) 2013-21¹⁰ was established, containing guidance on the use of non-transmitting devices during any phase of flight.

As a second step, the Agency has launched the present rulemaking task. This NPA is meant to provide proposals with the objective to enable the expanded use of any kind of PEDs by reviewing and amending the operational provisions (included in AMC and GM) related to the PED policy. Thereby, intentional transmitters (T-PEDs) and non-intentional transmitters are considered, taking into account the information contained in the SIB. Furthermore, emphasis is given to aircraft technical aspects as well as to cabin safety elements¹¹. The Agency's approach concerning the proposed amendments can be summarised in two steps:

1. The operator has to ensure that PEDs have no negative impact on the safe operation of the aircraft, i.e. the operator has to demonstrate that PEDs do not interfere with on-board electronic systems and equipment.
2. In accordance with 1., the use of PEDs may be granted under the responsibility of the operator, i.e. the operator decides which PED may be used during which phases of the flight.

It should be noted that after the publication of the envisaged new operational provisions on the use of PEDs, SIB 2013-21 is not needed any longer and, therefore, will be cancelled.

2.2. 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 this chapter of the NPA.

The specific objective of this proposal is to enable the expanded use of any kind of PEDs during various phases of flight by reviewing and updating the operational provisions related to PED policy.

2.3. Summary of the Regulatory Impact Assessment (RIA)

The complete Regulatory Impact Assessment (RIA) related to the present rulemaking task can be found in Chapter 4 of this NPA. The options identified in the RIA are as follows:

- Option 0: **Baseline option:** No change to the AMC and GM, i.e. no specific risk;
- Option 1: **Use of PEDs when technical prerequisites are met:** Amend the AMC and GM to permit the use of any kind of PEDs, when specific technical prerequisites (certification or interference assessment) have been fulfilled; and
- Option 2: **Use of PEDs with no prerequisites:** Amend the AMC and GM to permit the use of any kind of PEDs. No specific technical measures are required as a prerequisite.

Concerning the safety impact, Options 0 and 1 are expected not to change the safety risk, while Option 2 would have a substantial negative impact on safety. Therefore, Option 2 is not considered any further.

¹⁰ <http://easa.europa.eu/easa-and-you/passenger-experience/personal-electronic-devices-ped-board>.

¹¹ The Terms of Reference related to this rulemaking task describe a second task which is to introduce PEDs as items to be considered during aircraft certification. This second task will be covered in a separate NPA.

No economic impact is foreseen for Option 0. For Option 1 the economic impact on aircraft configuration and crew training can be considered minor compared to other economic impacts related to the aircraft operation. Therefore, when comparing Options 0 and 1, the economic impact can be neglected.

The further comparison of Option 0 and 1 leads to the following conclusion:

- Option 1 will lead to a positive social impact due to an increased passenger comfort and satisfaction, when the permission for the expanded use of PEDs is handled in an appropriate manner by the operator.
- Option 1 will lead to better harmonisation with the current FAA rules and with the expected ICAO procedures. As a result of this better harmonisation a reduction of passenger conflicts and confusion is expected.

Therefore, when considering the different evaluating factors, Option 1 is the preferred option.

2.4. Overview of the proposed amendments

This paragraph provides a short substantiation concerning the proposed amendments to the AMC and GM, or explains why no amendments are suggested. In addition, information is given on how and where the proposed amendments have been incorporated. The substantiation and information given below is structured in the same order as the proposed amendments to the AMC and GM are documented in Chapter 3.

Annex III – Part-ORO

Crew training: The provisions for flight crew, cabin crew and technical crew training are laid down in Part-ORO. On the first sight, with the envisaged permission of the use of PEDs, one would think that the training requirements in Part-ORO may have to be amended. However, these requirements mainly describe the objectives and the content of the training. A detailed description e.g. of the cabin crew training on passenger briefing concerning the use of PEDs would mean an inappropriate level of detail. Therefore, the Agency decided not to amend Part-ORO. Instead, provisions e.g. concerning crew training related to passenger briefing are provided in the AMC and GM on PEDs within the 'operational parts' (see below, paragraph (d) of AMC2 CAT.GEN.MPA.140 in Part-CAT and paragraph (d) in AMC2 NCC.GEN.130 in Part-NCC).

Annex IV – Part-CAT

1. **Restructuring the AMC:** In the present applicable framework, restrictions on the use of PEDs are laid down in AMC1 CAT.GEN.MPA.140. Since it is proposed to permit, under certain pre-conditions, the use of any kind of PEDs, the 'philosophy' of this AMC had to be changed from 'restriction' to 'permission'. In addition, detailed provisions concerning technical prerequisites and on-board operational procedures permitting a safe use had to be incorporated. The Agency, therefore, decided to replace the current AMC with two separate AMCs, the first one containing the technical prerequisites and the second one containing the operational procedures for the use of PEDs.
2. **Technical prerequisites:** The 'new' **AMC1 CAT.GEN.MPA.140** contains the technical prerequisites for the use of PEDs, including the following main provisions:

- In paragraph (b) the prerequisites concerning the aircraft configuration are highlighted. This includes the proposal to tailor the assessment concerning PED tolerance to different aircraft zones.
 - In the important paragraph (c), six possible scenarios for permitting the use of PEDs are described. This includes the description of the technical prerequisites to be fulfilled before the use of PEDs may be permitted. The overarching principle is that PEDs can only be used when it has been demonstrated that they do not negatively interfere with the aircraft systems and equipment.
 - Paragraph (d) provides detailed provisions concerning test methods. Compared to the 'old' AMC1 CAT.GEN.MPA.140, the paragraph has been restructured and test methods for cargo tracking devices have been included.
 - Paragraph (e) contains provisions concerning the operational conditions for operator controlled PED (C-PEDs) and cargo tracking devices.
 - Finally, paragraph (f) contains provisions concerning batteries for C-PEDs and cargo tracking devices.
3. **Operational procedures:** Build on the technical prerequisites described in the 'new' AMC1 CAT.GEN.MPA.140, the 'new' **AMC2 CAT.GEN.MPA.140** contains the on-board operational procedures for the use of PEDs. This includes the following measures:
- In paragraph (b) reference is given that the technical prerequisites should be fulfilled adequately before the use of any kind of PEDs is permitted.
 - Paragraph (c) contains provisions related to the management system.
 - Paragraph (d) contains detailed provisions on the use of PEDs in the passenger compartment. This includes provisions on operator's procedures and training, on passenger information and briefing, on stowage and on further safety measures. It is explicitly stated that the use of all PEDs may be permitted during all phases of flight, granted under the responsibility of the operator.
 - In paragraph (e) the use of PEDs in the flight compartment is regulated, while in paragraph (f) provisions for the use of PEDs not accessible during the flight are laid down.

When comparing the 'new' AMC2 CAT.GEN.MPA.140 with the 'old' AMC1 CAT.GEN.MPA.140, the changes can be summarised as follows:

- The overall scope has been changed in light of permitting the use of all PEDs;
 - New provisions have been added; and
 - Provisions containing outdated (technical) restrictions have been deleted.
4. **Definitions:** Concerning the definitions related to PEDs (see **GM1 CAT.GEN.MPA.140**) the following changes have been made:
- the term 'spurious emissions' has been introduced in paragraph (a)(1);
 - the list of examples for PEDs in paragraph (a)(1) has been updated;
 - a definition of the term 'cargo tracking device' is provided in paragraph (c);

- when discussing the possible scenarios for permitting the use of PEDs in paragraph (c) of AMC1 CAT.GEN.MPA.140, one important item used is the front and back door interference. In order to explain the terms ‘front door coupling’ and ‘back door coupling’, guidance has been introduced as paragraph (d).
- 5. **Fire caused by PEDs:** In **GM2 CAT.GEN.MPA.140**, reference is now also given to ICAO Doc 9481 which contains guidance for developing procedures for incidents involving dangerous goods (e.g. batteries) in PEDs. In addition, editorial changes have been made to the GM.
- 6. **Cargo tracking devices evaluation:** The proposed amendment contains AMC on cargo tracking devices. The Agency decided that further technical information on the tracking device evaluation should be provided. Consequently, reference to documents containing detailed information on safety assessment, on high intensity radiated fields (HIRF) certification, and on failure mode and effects analysis is provided in **GM3 CAT.GEN.MPA.140**.
- 7. **Passenger briefing:** It is proposed to amend **AMC1 CAT.OP.MPA.170** by giving emphasis on ‘the use and stowage of PEDs’ instead of ‘restrictions on the use of PEDs’ (see the provisions for passenger briefing before take-off and before landing).

Annex VI – Part-NCC

1. **Use of PEDs:** For Part-NCC, in the following paragraphs, the same amendments are proposed as described above for Part-CAT:
 - AMC1 NCC.GEN.130 Technical prerequisites for the use of PEDs;
 - AMC2 NCC.GEN.130 Procedures for the use of PEDs;
 - GM1 NCC.GEN.130 Definitions;
 - GM3 NCC.GEN.130 Fire caused by PEDs; and
 - GM4 NCC.GEN.130 Tracking devices evaluation.
2. **Description of risks:** In **GM2 NCC.GEN.130** the risks and possible countermeasures are described, when PEDs are used. The Agency proposes a minor amendment in the last sentence of paragraph (d), changing ‘not operating PEDs on-board is the safest option’ to ‘... is the safe option’¹².

Annex VII – Part-NCO and Annex VIII – Part-SPO

1. **Definitions of PEDs:** The proposed changes in **GM1 NCO.GEN.125** and in **GM1 SPO.GEN.130** are the same as in paragraph (a)(1) of GM1 CAT.GEN.MPA.140, as described above.
2. **Description of risks:** The proposed change in **GM2 NCO.GEN.125** and in **GM2 SPO.GEN.130** is the same as in GM2 NCC.GEN.130, as described above.
3. **Fire caused by PEDs:** The proposed changes in **GM3 NCO.GEN.125** and in **GM3 SPO.GEN.130** are the same as in GM3 CAT.GEN.MPA.140, as described above.

No amendments proposed

¹² This change brings the text in line with GM1 CAT.GEN.NMPA.120 on the same subject.

GM1 CAT.GEN.NMPA.120 on PEDs in non-motor powered aircraft does not need to be amended.

3. Proposed amendments

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

- (a) deleted text is marked with ~~strike through~~;
- (b) new or amended text is highlighted in **grey**;
- (c) an ellipsis (...) indicates that the remaining text is unchanged in front of or following the reflected amendment.

3.1. Draft Acceptable Means of Compliance and Guidance Material (Draft EASA Decision)

3.1.1 Annex IV - Part-CAT (ED Decision 2014/015/R)

...

AMC1 CAT.GEN.MPA.140 Portable electronic devices

GENERAL

(a) ~~Scope~~

~~This AMC provides means to prevent that portable electronic devices (PEDs) on board aircraft adversely affect the performance of the aircraft's systems and equipment. This AMC addresses operation of PEDs in the different aircraft zones — passenger compartment, flight compartment, and cargo compartments. Furthermore, it addresses the specific case of PEDs qualified and under configuration control by the operator — controlled PEDs (C-PEDs) — for which the operator gives some credit.~~

(b) ~~Restrictions on the use of PEDs in the passenger compartment~~

~~If an operator permits passengers to use PEDs on board its aircraft, procedures should be in place to control their use. The operator should ensure that all crew members and ground personnel are trained to enforce the restrictions on this equipment in line with these procedures.~~

~~These procedures should ensure the following:~~

- (1) ~~As the general principle all PEDs (including transmitting PEDs (T-PEDs)) are switched off at the start of the flight when the passengers have boarded and all doors have been closed, until a passenger door has been opened at the end of the flight.~~
- (2) ~~The following exceptions from the general principle may be granted under the responsibility of the operator:~~
 - (i) ~~Medical equipment necessary to support physiological functions does not need to be switched off.~~
 - (ii) ~~The use of PEDs, excluding T-PEDs, may be permitted during all phases of flight.~~
 - (iii) ~~T-PEDs may be used during non-critical phases of flight, excluding taxiing, if the aircraft is equipped with a system or otherwise certified allowing the operation of such technology during flight. The restrictions~~

- coming from the corresponding aircraft certification as documented in the aircraft flight manual (AFM), or equivalent document(s), stay in force.
- ~~(iv) The use of C-PEDs during critical phases of flight, however, may only be permitted if the operator has accounted for this situation in its assessment.~~
 - ~~(v) The commander may permit the use of any kind of PED when the aircraft is stationary during prolonged departure delays, provided that sufficient time is available to check the passenger compartment before the flight proceeds. Similarly, after landing, the commander may authorise the use of any kind of PED in the event of a prolonged delay for a parking/gate position (even though doors are closed and the engines are running).~~
- ~~(3) Announcements should be made during boarding of the aircraft to inform passengers of the restrictions applicable to PEDs (in particular to T-PEDs) before fastening their seat belts.~~
 - ~~(4) Where in-seat electrical power supplies are available for passenger use, the following should apply:
 - ~~(i) information cards giving safety instructions are provided to the passengers;~~
 - ~~(ii) PEDs should be disconnected from any in-seat electrical power supply during taxiing, take off, approach, landing, and during abnormal or emergency conditions; and~~
 - ~~(iii) flight crew and cabin crew should be aware of the proper means to switch off in-seat power supplies used for PEDs.~~~~
 - ~~(5) During boarding and any phase of flight:
 - ~~(i) appropriate coordination between flight crew and cabin crew is defined to deal with interference or other safety problems associated with PEDs;~~
 - ~~(ii) passenger use of equipment during the flight is monitored;~~
 - ~~(iii) suspect equipment is switched off; and~~
 - ~~(iv) particular attention is given to passenger misuse of equipment that could include a built-in transmitting function.~~~~
 - ~~(6) Thermal runaways of batteries, in particular lithium batteries, and potential resulting fire can be handled properly.~~
 - ~~(7) Appropriate coordination between flight crew and cabin crew should be defined to deal with interference or other safety problems associated with PEDs.~~
 - ~~(8) The commander may for any reason and during any phase of flight require deactivation and stowage of PEDs.~~
 - ~~(9) Occurrences of suspected or confirmed interference that have potential safety implications should be reported to the competent authority. Where possible, to assist follow up and technical investigation, reports should describe the offending device, identify the brand name and model number, its location in the aircraft at the time of the occurrence, interference symptoms and the results of actions taken by the crew.~~

~~The cooperation of the device owner should be sought by obtaining contact details.~~

~~(10) Special requests to operate a PED or T-PED during any phase of the flight for specific reasons (e.g. for security measures) should be handled properly.~~

~~(c) Restrictions on the use of PEDs in the flight compartment~~

~~Due to the higher risk of interference and potential for distracting crew from their duties, PEDs should not be used in the flight compartment. However, the operator may allow the use of PEDs, e.g. to assist the flight crew in their duties if procedures are in place to ensure the following:~~

~~(1) The conditions for the use of PEDs in flight are specified in the operations manual, otherwise they should be switched off and stowed during all phases of flight.~~

~~(2) The PEDs do not pose a loose item risk or other hazard.~~

~~(3) During critical phases of flight, only those C-PEDs are operated, for which the operator has demonstrated that the radio frequency (RF) interference levels are below those considered acceptable for the specific aircraft environment. Guidance for such test is provided in (e) below.~~

~~(4) During pre-flight procedures, e.g. when loading route information into navigation systems or when monitoring fuel loading, no T-PED should be operated. In all other cases, flight crew and other persons on board the aircraft involved in dispatching the aircraft should observe the same restrictions as applicable to passengers.~~

~~(5) These restrictions should not preclude use of a T-PED (specifically a mobile phone) by the flight crew to deal with an emergency. However, reliance should not be predicated on a T-PED for this purpose.~~

~~(d) PEDs not accessible during the flight~~

~~PEDs should be switched off, when not accessible for deactivation during flight. This should apply especially to PEDs contained in baggage or transported as part of the cargo. The operator may allow deviation for PEDs for which tests have demonstrated their safe operation. Other precautions, such as transporting in shielded metal boxes, may also be used to mitigate associated risks.~~

~~In case an automated function is used to deactivate a T-PED, the unit should be qualified for safe operation on board the aircraft.~~

~~(e) Test methods~~

~~The means to demonstrate that the RF radiations (intentional or non-intentional) are tolerated by aircraft systems should be as follows:~~

~~(1) The radio frequency (RF) emissions of PEDs should meet the levels as defined by EUROCAE ED-14E/RTCA DO-160E Section 21 Category M for operation in the passenger compartment, and EUROCAE ED-14E/RTCA DO-160E Section 21 Category H for operation in the cargo bay. Later revisions of those documents may be used for testing. The assessment of intentional transmissions of T-PEDs is excluded from those test standards and needs to be addressed separately.~~

- (2) ~~When the operator intends to allow the operation of T-PEDs, its assessment should follow the principles set out in EUROCAE ED-130.~~

AMC1 CAT.GEN.MPA.140 Portable electronic devices

TECHNICAL PREREQUISITES FOR THE USE OF PEDS

(a) Scope

This AMC describes the technical prerequisites under which portable electronic devices (PEDs) may be used on board the aircraft without adversely affecting the performance of the aircraft's systems and equipment. This AMC addresses any kind of PED, including controlled PEDs (C-PEDs).

(b) Prerequisites concerning the aircraft configuration

- (1) Before an operator may permit the use of any kind of PED on-board, it should ensure that PEDs have no negative impact on the safe operation of the aircraft. The operator should demonstrate that PEDs do not interfere with on-board electronic systems and equipment, especially with the aircraft's navigation and communication systems.
- (2) The assessment concerning PED tolerance may be tailored to the different aircraft zones for which the use of PEDs is considered, i.e. may address separately:
 - (i) the passenger compartment;
 - (ii) the flight crew compartment; and
 - (iii) areas not accessible during the flight.

(c) Possible scenarios for permitting the use of PEDs should be as documented below. The scenarios are listed in a descending order, i.e. the preferred scenario is given on the top and the least preferred one is listed at the bottom:

- (1) Technical condition. The aircraft is certified as T-PED tolerant. In this case it has been demonstrated during the certification process that front door and back door coupling have no negative impact on the safe operation of the aircraft. Restrictions arising from the corresponding aircraft certification, as documented in the aircraft flight manual (AFM) or equivalent document(s), should stay in force. They may be linked to different aircraft zones, or to transmitting technologies covered.

Conclusion: The operator may permit the use of any kind of PEDs during all phases of flight.

- (2) Technical condition. The operator has performed a complete evaluation for T-PED tolerance using the method described in (d)(1)(i).

Conclusion: The operator may permit the use of any kind of PEDs during all phases of flight.

- (3) Technical condition. The aircraft is certified for certain technologies (e.g. WLAN or mobile phones) or the electromagnetic interference (EMI) assessment has demonstrated that:

- (i) the front door coupling has no negative safety impact; and

- (ii) the back door coupling has no negative safety impact concerning certain technologies (e.g. WLAN or mobile phones).

Conclusion: The operator may permit the use of PEDs during all phases of flight, including T-PEDs with certain technologies (e.g. WLAN or mobile phones). The use of other T-PEDs should not be permitted.

- (4) Technical condition. The EMI assessment has demonstrated that the front door coupling has no negative safety impact for PEDs which are not T-PEDs.

Conclusion: The operator may permit the use of PEDs, except T-PEDs, during all phases of flight.

- (5) Technical condition. An EMI assessment has not been performed.

Conclusion: The operator:

- (i) may permit the use of PEDs, except T-PEDs, during all phases of flight, except during low visibility operation; and
- (ii) may permit C-PEDs, when it has been demonstrated through tests as described in (d)(1)(ii) that their interference level is acceptable to permit their operation during all phases of flight.

- (6) Technical condition. Notwithstanding scenarios (4) and (5):

Conclusion: The operator may permit the use of any kind of PEDs during taxi-in after the end of landing roll.

(d) Test methods

(1) EMI assessment

The means to demonstrate that the radio frequency (RF) emissions (intentional or non-intentional) are tolerated by aircraft systems should be as follows:

- (i) When the operator intends to perform interference assessments, its assessment should follow:
 - (A) RTCA DO-294C, Appendix 5C, or alternately RTCA DO-307, Section 4, to address front door coupling susceptibility; and
 - (B) EUROCAE ED-130, Annex 6, RTCA DO-294C, Appendix 6D, and RTCA DO-307, Section 3, to address back door coupling susceptibility.
- (ii) The RF emissions of C-PEDs should meet the levels as defined by:
 - (A) EUROCAE ED-14E/RTCA DO 160E, Section 21, Category M, for operation in the passenger compartment; and
 - (B) EUROCAE ED-14E/RTCA DO 160E, Section 21, Category H, for operation in the cargo bay.

Later revisions of those documents may be used for testing. The assessment of intentional transmissions of T-PEDs are not covered by those test standards and should be addressed separately (e.g. by deactivating the transmitting function in flight (flight mode)).

(2) Cargo tracking devices

In case a transmitting function is automatically deactivated in a cargo tracking device (being a T-PED), the unit should be qualified for safe operation on board the aircraft. The following methods should be considered acceptable as evidence for safe operation:

- (i) A type-specific safety assessment, including failure mode and effects analysis, has been performed at aircraft level. The main purpose of the assessment should be to determine the worst hazards and to demonstrate an adequate design assurance level of the relevant hardware and software components of the cargo tracking device.
- (ii) The high intensity radiated field (HIRF) certification of the aircraft has been performed, i.e. the aircraft type has been certified after 1987 and meets the appropriate special condition. In such a case, the operator should observe the following:
 - (A) The use of the tracking devices is strictly limited to aircraft where it has been demonstrated that the critical systems (those having failure conditions with major, hazardous, or catastrophic severities, and those which are required by operational regulations) are not susceptible to back door coupling.
 - (B) The tracking device:
 - (a) features an automated and prolonged radio suspension in flight using multiple modes of redundancy; and
 - (b) has been tested in flight to demonstrate that the intended function of the automated radio suspension is met.
 - (C) The transmissions of the tracking device are limited per design to short periods of time (less than 1 second per 1 000 seconds) and cannot be continuous.
 - (D) In order to provide assurance on the tracking device design and production, the following documents are retained as part of the evaluation package:
 - (a) operational description, technical specifications, product label and images of the tracking device and any peripheral attachments;
 - (b) failure mode and effects analysis report of the tracking device and any peripheral attachments;
 - (c) declaration of stringent design and production controls in place during the tracking device manufacturing; and
 - (d) the report showing compliance to the European Norm (EN) defining the transmitter characteristic of the tracking device or its transmission module.
- (iii) The tracking device interference levels during transmission are below those considered acceptable for the specific aircraft environment.

(e) Operational conditions of C-PEDs and cargo tracking devices

The operator should ensure that C-PEDs and cargo tracking devices are maintained in good and safe condition, having in mind that:

- (1) damages to the transmission modules or antenna may modify its emissions characteristics; and
- (2) damages to the battery may create a fire hazard.

(f) Batteries in C-PEDs and cargo tracking devices

Lithium-type batteries in C-PEDs and cargo tracker devices should meet one of the following standards:

- (1) United Nations (UN) Transportation Regulations, UN ST/SG/AC.10/11, 'Recommendations on the Transport of Dangerous Goods - Manual of Tests and Criteria';
- (2) Underwriters Laboratory UL 1642, 'Lithium Batteries';
- (3) Underwriters Laboratory UL 2054, 'Household and Commercial Batteries';
- (4) Underwriters Laboratory UL 60950-1, 'Information Technology Equipment – Safety';
- (5) International Electrotechnical Commission (IEC), International Standard IEC 62133, 'Secondary Cells and Batteries Containing Alkaline or other non-acid Electrolytes - Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made from them, for Use in Portable Applications';
- (6) RTCA/DO-311, 'Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems'. RTCA/DO-311 may be used to address concerns regarding overcharging, over-discharging, and the flammability of cell components. The standard is intended to test permanently installed equipment; however, these tests are applicable and sufficient to test electronic flight bags rechargeable lithium-type batteries; or
- (7) European Technical Standard Order (ETSO) C142a, 'Non-rechargeable Lithium Cells and Batteries'.

AMC2 CAT.GEN.MPA.140 Portable electronic devices

PROCEDURES FOR THE USE OF PEDS

(a) Scope

This AMC describes the procedures under which portable electronic devices (PEDs) may be used on board the aircraft without adversely affecting the performance of the aircraft's systems and equipment. This AMC addresses any kind of PED, including controlled PEDs (C-PEDs), and operation of PEDs in the different aircraft zones – passenger compartment, flight compartment, and areas inaccessible during the flight.

(b) Prerequisites

Before permitting the use of any kind of PEDs the operator should ensure compliance with (c) of AMC1 CAT.GEN.MPA.140.

(c) Hazard identification and risk assessment

The operator should identify the safety hazards and manage the associated risks following the management system implemented in accordance with ORO.GEN.200. The risk assessment should include hazards associated with:

- (1) PED use during various phases of flight;
- (2) PED use during turbulence;
- (3) improperly stowed PEDs;
- (4) impeded or slowed evacuations;
- (5) passenger non-compliance, e.g. not deactivating transmitting functions, not switching off PEDs or not stowing PEDs properly;
- (6) unruly passengers; and
- (7) battery fire.

(d) Use of PEDs in the passenger compartment

(1) Procedures and training

If an operator permits passengers to use PEDs on board its aircraft, procedures should be in place to control their use. These procedures should include provisions for passenger briefing, passenger handling and for the stowage of PEDs. The operator should ensure that all crew members and ground personnel are trained to enforce possible restrictions concerning the use of PEDs, in line with these procedures.

(2) Provisions for use

- (i) The use of PEDs in the passenger compartment may be granted under the responsibility of the operator, i.e. the operator decides which PED may be used during which phases of the flight.
- (ii) Medical equipment necessary to support physiological functions may be used at all times and does not need to be switched-off.

(3) Passenger information, passenger briefing and stowage of PEDs

- (i) The operator should provide general information on the use of PEDs to the passengers before the flight. This information should specify at least:
 - (A) which PEDs can be used during which phases of the flight;
 - (B) when, which and where PEDs are to be stored; and
 - (C) that the instructions of the crew are to be followed at all times.
- (ii) In accordance with CAT.OP.MPA.170, the use of PEDs should be part of the passenger briefing. The operator should encourage passengers to avoid distraction during such briefings.
- (iii) In accordance with CAT.OP.MPA.160 passengers should be briefed on the operator's procedures concerning the stowage of PEDs. The operator should:
 - (A) identify the phases of flight in which PEDs are to be stowed; and
 - (B) determine suitable stowage locations, taking into account the PEDs' size and weight.

(4) In-seat electrical power supplies

Where in-seat electrical power supplies are available for passenger use, the following should apply:

- (i) information cards giving safety instructions should be provided to the passengers;
- (ii) PEDs should be disconnected from any in-seat electrical power supply during taxiing, take-off, approach, landing, and during abnormal or emergency conditions; and
- (iii) flight crew, cabin crew and technical crew should be aware of the proper means to switch-off in-seat power supplies used for PEDs.

(5) Operator's safety measures during boarding and any phase of flight

- (i) Appropriate coordination between flight crew, cabin crew and technical crew should be established to deal with interference or other safety problems associated with PEDs.
- (ii) Suspect equipment should be switched off.
- (iii) Particular attention should be given to passenger misuse of equipment.
- (iv) Thermal runaways of batteries, in particular lithium batteries, and potential resulting fire, should be handled properly.
- (v) The commander may, for any reason and during any phase of flight, require deactivation and stowage of PEDs.
- (vi) When the operator restricts the use of PEDs, it should be prepared handling special requests to operate a T-PED during any phase of the flight for specific reasons (e.g. for security measures).

(6) Reporting

- (i) Occurrences of suspected or confirmed interference that have potential safety implications should be reported to the competent authority. Where possible, to assist follow-up and technical investigation, reports should describe the offending device, identify the brand name and model number, its location in the aircraft at the time of the occurrence, interference symptoms and the results of actions taken by the crew.
- (ii) The cooperation of the device owner should be sought by obtaining contact details.

(e) Use of PEDs in the flight crew compartment

In the flight crew compartment the operator may permit the use of PEDs, e.g. to assist the flight crew in their duties, when procedures are in place to ensure the following:

- (1) The conditions for the use of PEDs in-flight are specified in the operations manual, otherwise they should be switched off and stowed during all phases of flight.
- (2) The PEDs do not pose a loose-item risk or other hazard.

(3) These provisions should not preclude use of a T-PED (specifically a mobile phone) by the flight crew to deal with an emergency. However, reliance should not be predicated on a T-PED for this purpose.

(f) PEDs not accessible during the flight

PEDs should be switched off, when not accessible for deactivation during flight. This should apply especially to PEDs contained in baggage or transported as part of the cargo. The operator may permit deviation for PEDs for which safe operation has been demonstrated in accordance with AMC1 CAT.GEN.MPA.140. Other precautions, such as transporting in shielded metal boxes, may also be used to mitigate associated risks.

GM1 CAT.GEN.MPA.140 Portable electronic devices

DEFINITIONS

(a) Definition and categories of PEDs

PEDs are any kind of electronic device, typically but not limited to consumer electronics, brought on board the aircraft by crew members, passengers, or as part of the cargo and that are not included in the approved aircraft configuration. All equipment that is able to consume electrical energy falls under this definition. The electrical energy can be provided from internal sources as batteries (chargeable or non-rechargeable) or the devices may also be connected to specific aircraft power sources.

PEDs fall into three categories:

- (1) Non-intentional transmitters can non-intentionally radiate RF transmissions, sometimes referred to as spurious emissions. This category includes, but is not limited to, ~~computing equipment~~ calculators, cameras, radio receivers, audio and video ~~reproducers~~ players, electronic games and toys. In addition, portable, non-transmitting devices provided to assist crew members in their duties are included in this category. The category is identified as PED.
- (2) Intentional transmitters can radiate RF transmissions on specific frequencies as part of their intended function. In addition, they may radiate non-intentional transmissions like any PED. The term 'transmitting PED' (T-PED) is used to identify the transmitting capability of the PED. Intentional transmitters are transmitting devices such as RF-based remote control equipment, which may include some toys, two-way radios (sometimes referred to as 'private mobile radio'), mobile phones of any type, satellite phones, computers with mobile phone data connection, wireless fidelity (WIFI) or Bluetooth capability. After deactivation of the transmitting capability, e.g. by activating the so-called 'flight mode' or 'flight safety mode', the T-PED remains a PED having non-intentional emissions.
- (3) A controlled PED (C-PED) is subject to administrative control by the operator. This will include, inter alia, tracking the location of the devices to specific aircraft or persons and ensuring that no unauthorised changes are made to the hardware, software or databases. A controlled PED will also be subject to procedures to ensure that it is maintained to the latest amendment state. C-

PEDs can be assigned to the category of non-intentional transmitters (PEDs) or intentional transmitters (T-PEDs).

(b) Definition of the switched-off status

Many PEDs are not completely disconnected from the internal power source when switched off. The switching function may leave some remaining functionality e.g. data storage, timer, clock, etc. These devices can be considered switched off when in the deactivated status. The same applies to devices having no transmit capability and operated by coin cells without further deactivation capability, e.g. wrist watches.

(c) A cargo tracking device is a PED attached to or included in airfreight (e.g. in or on containers, palettes, parcels or baggage). If the device is equipped with a wireless data transmitter, it utilises communication standards for portable devices.

(d) Electromagnetic interference (EMI)

The two classes of EMI to be addressed can be described as follows:

(1) Front door coupling is the possible disturbance to an aircraft system as received by the antenna of the system and mainly in the frequency band used by the system. Any PED internal oscillation has the potential to radiate low level signals in the aviation frequency bands. Through this disturbance especially the instrument landing system (ILS) and the VHF omni range (VOR) navigation system may indicate erroneous information which are not detectable by the crew.

(2) Back door coupling is the possible disturbance of aircraft systems by electromagnetic fields generated by transmitters at a level which could exceed on short distance (i.e. within the aircraft) the electromagnetic field level used for the aircraft system certification. This disturbance may then lead to system malfunction.

GM2 CAT.GEN.MPA.140 Portable electronic devices

FIRE CAUSED BY PEDS

A detailed discussion of fire caused by PEDs can be found in CAA UK CAP 789 eEdition 2, eChapter 31, sSection 6, 'Fires in the cabin caused Cabin Caused by PEDs'¹³, inand CAA PAPER 2003/4, 'Dealing With In-Flight Lithium Battery Fires in Portable Electronic Devices', M.J. Lain, D.A. Teagle, J. Cullen, V. Dass¹⁴ and in ICAO Doc 9481, 'Emergency Response Guidance for aircraft Incidents Involving Dangerous Goods'.

GM3 CAT.GEN.MPA.140 Portable electronic devices

CARGO TRACKING DEVICES EVALUATION

(a) Safety assessment

Further guidance on performing a safety assessment can be found in AMC 25.1309, SAE ARP 4754, and SAE ARP 4761.

(b) HIRF certification

¹³ <http://www.caa.co.uk/docs/33/CAP%20789.pdf>.

¹⁴ http://www.caa.co.uk/docs/33/CAPAP2003_04.PDF.

The type certificate data sheet (TCDS), available on the EASA website for each aircraft model having EASA certification, lists whether the HIRF certification has been performed through a special condition. The operator may contact the type certification holder to gain the necessary information.

(c) Failure mode and effects analysis

Further guidance on performing a failure mode and effects analysis can be found in SAE ARP 4761 and MIL-STD-1629A.

...

AMC1 CAT.OP.MPA.170 Passenger briefing

PASSENGER BRIEFING

Passenger briefings should contain the following:

(a) Before take-off

(1) Passengers should be briefed on the following items if applicable:

- (i) smoking regulations;
- (ii) back of the seat to be in the upright position and tray table stowed;
- (iii) location of emergency exits;
- (iv) location and use of floor proximity escape path markings;
- (v) stowage of hand baggage;
- (vi) ~~restrictions on the use~~ and stowage of portable electronic devices; and
- (vii) the location and the contents of the safety briefing card; and

(2) passengers should receive a demonstration of the following:

- (i) the use of safety belts or restraint systems, including how to fasten and unfasten the safety belts or restraint systems;
- (ii) the location and use of oxygen equipment, if required. Passengers should also be briefed to extinguish all smoking materials when oxygen is being used; and
- (iii) the location and use of life-jackets, if required.

(b) After take-off

(1) passengers should be reminded of the following, if applicable:

- (i) smoking regulations; and
- (ii) use of safety belts or restraint systems including the safety benefits of having safety belts fastened when seated irrespective of seat belt sign illumination.

(c) Before landing

(1) passengers should be reminded of the following, if applicable:

- (i) smoking regulations;
- (ii) use of safety belts or restraint systems;

- (iii) back of the seat to be in the upright position and tray table stowed;
- (iv) re-stowage of hand baggage; and
- (v) ~~restrictions on the use~~ **and stowage** of portable electronic devices.

...

3.1.2 Annex VI - Part-NCC (ED Decision 2013/021/R)

...

AMC1 NCC.GEN.130 Portable electronic devices

GENERAL

~~(a) Scope~~

~~This AMC provides means to prevent that portable electronic devices (PEDs) on board aircraft adversely affect the performance of the aircraft's systems and equipment. This AMC addresses operation of PEDs in the different aircraft zones — passenger compartment, flight compartment, and cargo compartments. Furthermore, it addresses the specific case of PEDs qualified and under configuration control by the operator — controlled PEDs (C-PEDs) — for which the operator gives some credit.~~

~~(b) Restrictions on the use of PEDs in the passenger compartment~~

~~If an operator permits passengers to use PEDs on board its aircraft, procedures should be in place to control their use. The operator should ensure that all crew members and ground personnel are trained to enforce the restrictions on this equipment in line with these procedures.~~

~~These procedures should ensure the following:~~

- ~~(1) As the general principle all PEDs (including transmitting PEDs (T-PEDs)) are switched off at the start of the flight when the passengers have boarded and all doors have been closed, until a passenger door has been opened at the end of the flight.~~
- ~~(2) The following exceptions from the general principle may be granted under the responsibility of the operator:~~
 - ~~(i) Medical equipment necessary to support physiological functions does not need to be switched off.~~
 - ~~(ii) The use of PEDs, excluding T-PEDs, may be permitted during all phases of flight.~~
 - ~~(iii) T-PEDs may be used during non-critical phases of flight, excluding taxiing, if the aircraft is equipped with a system or otherwise certified allowing the operation of such technology during flight. The restrictions coming from the corresponding aircraft certification as documented in the aircraft flight manual (AFM), or equivalent document(s), stay in force.~~
 - ~~(iv) The use of C-PEDs during critical phases of flight, however, may only be permitted if the operator has accounted for this situation in its assessment.~~

- ~~(v) The commander may permit the use of any kind of PED when the aircraft is stationary during prolonged departure delays, provided that sufficient time is available to check the passenger compartment before the flight proceeds. Similarly, after landing, the commander may authorise the use of any kind of PED in the event of a prolonged delay for a parking/gate position (even though doors are closed and the engines are running).~~
- ~~(3) Announcements should be made during boarding of the aircraft to inform passengers of the restrictions applicable to PEDs (in particular to T-PEDs) before fastening their seat belts.~~
- ~~(4) Where in-seat electrical power supplies are available for passenger use, the following should apply:
 - ~~(i) information cards giving safety instructions are provided to the passengers;~~
 - ~~(ii) PEDs should be disconnected from any in-seat electrical power supply during taxiing, take-off, approach, landing, and during abnormal or emergency conditions; and~~
 - ~~(iii) flight crew and cabin crew should be aware of the proper means to switch-off in-seat power supplies used for PEDs.~~~~
- ~~(5) During boarding and any phase of flight:
 - ~~(i) appropriate coordination between flight crew and cabin crew is defined to deal with interference or other safety problems associated with PEDs;~~
 - ~~(ii) passenger use of equipment during the flight is monitored;~~
 - ~~(iii) suspect equipment is switched off; and~~
 - ~~(iv) particular attention is given to passenger misuse of equipment that could include a built-in transmitting function.~~~~
- ~~(6) Thermal runaways of batteries, in particular lithium batteries, and potential resulting fire can be handled properly.~~
- ~~(7) Appropriate coordination between flight crew and cabin crew should be defined to deal with interference or other safety problems associated with PEDs.~~
- ~~(8) The commander may for any reason and during any phase of flight require deactivation and stowage of PEDs.~~
- ~~(9) Occurrences of suspected or confirmed interference that have potential safety implications should be reported to the competent authority. Where possible, to assist follow-up and technical investigation, reports should describe the offending device, identify the brand name and model number, its location in the aircraft at the time of the occurrence, interference symptoms and the results of actions taken by the crew.

The cooperation of the device owner should be sought by obtaining contact details.~~
- ~~(10) Special requests to operate a PED or T-PED during any phase of the flight for specific reasons (e.g. for security measures) should be handled properly.~~

~~(c) Restrictions on the use of PEDs in the flight compartment~~

~~Due to the higher risk of interference and potential for distracting crew from their duties, PEDs should not be used in the flight compartment. However, the operator may allow the use of PEDs, e.g. to assist the flight crew in their duties if procedures are in place to ensure the following:~~

- ~~(1) The conditions for the use of PEDs in flight are specified in the operations manual, otherwise they should be switched off and stowed during all phases of flight.~~
- ~~(2) The PEDs do not pose a loose item risk or other hazard.~~
- ~~(3) During critical phases of flight, only those C-PEDs are operated, for which the operator has demonstrated that the radio frequency (RF) interference levels are below those considered acceptable for the specific aircraft environment. Guidance for such test is provided in (c) below.~~
- ~~(4) During pre-flight procedures, e.g. when loading route information into navigation systems or when monitoring fuel loading, no T-PED should be operated. In all other cases, flight crew and other persons on board the aircraft involved in dispatching the aircraft should observe the same restrictions as applicable to passengers.~~
- ~~(5) These restrictions should not preclude use of a T-PED (specifically a mobile phone) by the flight crew to deal with an emergency. However, reliance should not be predicated on a T-PED for this purpose.~~

~~(d) PEDs not accessible during the flight~~

~~PEDs should be switched off, when not accessible for deactivation during flight. This should apply especially to PEDs contained in baggage or transported as part of the cargo. The operator may allow deviation for PEDs for which tests have demonstrated their safe operation. Other precautions, such as transporting in shielded metal boxes, may also be used to mitigate associated risks.~~

~~In case an automated function is used to deactivate a T-PED, the unit should be qualified for safe operation on board the aircraft.~~

~~(e) Test methods~~

~~The means to demonstrate that the RF radiations (intentional or non-intentional) are tolerated by aircraft systems should be as follows:~~

- ~~(1) The radio frequency (RF) emissions of PEDs should meet the levels as defined by EUROCAE ED-14E/RTCA DO-160E Section 21 Category M for operation in the passenger compartment, and EUROCAE ED-14E/RTCA DO-160E Section 21 Category H for operation in the cargo bay. Later revisions of those documents may be used for testing. The assessment of intentional transmissions of T-PEDs is excluded from those test standards and needs to be addressed separately.~~
- ~~(2) When the operator intends to allow the operation of T-PEDs, its assessment should follow the principles set out in EUROCAE ED-130.~~

AMC1 NCC.GEN.130 Portable electronic devices

TECHNICAL PREREQUISITES FOR THE USE OF PEDS

(a) Scope

This AMC describes the technical prerequisites under which portable electronic devices (PEDs) may be used on board the aircraft without adversely affecting the performance of the aircraft's systems and equipment. This AMC addresses any kind of PED, including controlled PEDs (C-PEDs).

(b) Prerequisites concerning the aircraft configuration

(1) Before an operator may permit the use of any kind of PED on-board, it should ensure that PEDs have no negative impact on the safe operation of the aircraft. The operator should demonstrate that PEDs do not interfere with on-board electronic systems and equipment, especially with the aircraft's navigation and communication systems.

(2) The assessment concerning PED tolerance may be tailored to the different aircraft zones for which the use of PEDs is considered, i.e. may address separately:

- (i) the passenger compartment;
- (ii) the flight crew compartment; and
- (iii) areas not accessible during the flight.

(c) Possible scenarios for permitting the use of PEDs should be as documented below. The scenarios are listed in a descending order, i.e. the preferred scenario is given on the top and the least preferred one is listed at the bottom:

(1) Technical condition. The aircraft is certified as T-PED tolerant. In this case it has been demonstrated during the certification process that front door and back door coupling have no negative impact on the safe operation of the aircraft. Restrictions arising from the corresponding aircraft certification, as documented in the aircraft flight manual (AFM) or equivalent document(s), should stay in force. They may be linked to different aircraft zones, or to transmitting technologies covered.

Conclusion: The operator may permit the use of any kind of PEDs during all phases of flight.

(2) Technical condition. The operator has performed a complete evaluation for T-PED tolerance using the method described in (d)(1)(i).

Conclusion: The operator may permit the use of any kind of PEDs during all phases of flight.

(3) Technical condition. The aircraft is certified for certain technologies (e.g. WLAN or mobile phones) or the electromagnetic interference (EMI) assessment has demonstrated that:

- (i) the front door coupling has no negative safety impact; and
- (ii) the back door coupling has no negative safety impact concerning certain technologies (e.g. WLAN or mobile phones).

Conclusion: The operator may permit the use of PEDs during all phases of flight, including T-PEDs with certain technologies (e.g. WLAN or mobile phones). The use of other T-PEDs should not be permitted.

- (4) Technical condition. The EMI assessment has demonstrated that the front door coupling has no negative safety impact for PEDs which are not T-PEDs.

Conclusion: The operator may permit the use of PEDs, except T-PEDs, during all phases of flight.

- (5) Technical condition. An EMI assessment has not been performed.

Conclusion: The operator:

- (i) *may permit the use of PEDs, except T-PEDs, during all phases of flight, except during low visibility operation; and*
- (ii) *may permit C-PEDs, when it has been demonstrated through tests as described in (d)(1(ii)) that their interference level is acceptable to permit their operation during all phases of flight.*

- (6) Technical condition. Notwithstanding scenarios (4) and (5):

Conclusion: The operator may permit the use of any kind of PEDs during taxi-in after the end of landing roll.

(d) Test methods

(1) EMI assessment

The means to demonstrate that the radio frequency (RF) emissions (intentional or non-intentional) are tolerated by aircraft systems should be as follows:

- (i) When the operator intends to perform interference assessments, its assessment should follow:
- (A) RTCA DO-294C, Appendix 5C, or alternately RTCA DO-307, Section 4, to address front door coupling susceptibility; and
- (B) EUROCAE ED-130, Annex 6, RTCA DO-294C, Appendix 6D, and RTCA DO-307, Section 3, to address back door coupling susceptibility.
- (ii) The RF emissions of C-PEDs should meet the levels as defined by:
- (A) EUROCAE ED-14E/RTCA DO 160E, Section 21, Category M, for operation in the passenger compartment; and
- (B) EUROCAE ED-14E/RTCA DO 160E, Section 21, Category H, for operation in the cargo bay.

Later revisions of those documents may be used for testing. The assessment of intentional transmissions of T-PEDs are not covered by those test standards and should be addressed separately (e.g. by deactivating the transmitting function in flight (flight mode)).

(2) Cargo tracking devices

In case a transmitting function is automatically deactivated in a cargo tracking device (being a T-PED), the unit should be qualified for safe operation on board the aircraft. The following methods should be considered acceptable as evidence for safe operation:

- (i) A type-specific safety assessment, including failure mode and effects analysis, has been performed at aircraft level. The main purpose of the assessment should be to determine the worst hazards and to demonstrate an adequate design assurance level of the relevant hardware and software components of the cargo tracking device.
 - (ii) The high intensity radiated field (HIRF) certification of the aircraft has been performed, i.e. the aircraft type has been certified after 1987 and meets the appropriate special condition. In such a case, the operator should observe the following:
 - (A) The use of the tracking devices is strictly limited to aircraft where it has been demonstrated that the critical systems (those having failure conditions with major, hazardous, or catastrophic severities, and those which are required by operational regulations) are not susceptible to back door coupling.
 - (B) The tracking device:
 - (a) features an automated and prolonged radio suspension in flight using multiple modes of redundancy; and
 - (b) has been tested in flight to demonstrate that the intended function of the automated radio suspension is met.
 - (C) The transmissions of the tracking device are limited per design to short periods of time (less than 1 second per 1 000 seconds) and cannot be continuous.
 - (D) In order to provide assurance on the tracking device design and production, the following documents are retained as part of the evaluation package:
 - (a) operational description, technical specifications, product label and images of the tracking device and any peripheral attachments;
 - (b) failure mode and effects analysis report of the tracking device and any peripheral attachments;
 - (c) declaration of stringent design and production controls in place during the tracking device manufacturing; and
 - (d) the report showing compliance to the European Norm (EN) defining the transmitter characteristic of the tracking device or its transmission module.
 - (iii) The tracking device interference levels during transmission are below those considered acceptable for the specific aircraft environment.
- (e) Operational conditions of C-PEDS and cargo tracking devices
- The operator should ensure that C-PEDs and cargo tracking devices are maintained in good and safe condition, having in mind that:
- (1) damages to the transmission modules or antenna may modify its emissions characteristics; and

(2) damages to the battery may create a fire hazard.

(f) Batteries in C-PEDs and cargo tracking devices

Lithium-type batteries in C-PEDs and cargo tracker devices should meet one of the following standards:

- (1) United Nations (UN) Transportation Regulations, UN ST/SG/AC.10/11, 'Recommendations on the Transport of Dangerous Goods - Manual of Tests and Criteria';
- (2) Underwriters Laboratory UL 1642, 'Lithium Batteries';
- (3) Underwriters Laboratory UL 2054, 'Household and Commercial Batteries';
- (4) Underwriters Laboratory UL 60950-1, 'Information Technology Equipment - Safety';
- (5) International Electrotechnical Commission (IEC), International Standard IEC 62133, 'Secondary Cells and Batteries Containing Alkaline or other non-acid Electrolytes - Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made from them, for Use in Portable Applications';
- (6) RTCA/DO-311, 'Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems'. RTCA/DO-311 may be used to address concerns regarding overcharging, over-discharging, and the flammability of cell components. The standard is intended to test permanently installed equipment; however, these tests are applicable and sufficient to test electronic flight bags rechargeable lithium-type batteries; or
- (7) European Technical Standard Order (ETSO) C142a, 'Non-rechargeable Lithium Cells and Batteries'.

AMC2 NCC.GEN.130 Portable electronic devices

PROCEDURES FOR THE USE OF PEDS

(a) Scope

This AMC describes the procedures under which portable electronic devices (PEDs) may be used on board the aircraft without adversely affecting the performance of the aircraft's systems and equipment. This AMC addresses any kind of PED, including controlled PEDs (C-PEDs), and operation of PEDs in the different aircraft zones — passenger compartment, flight compartment, and areas inaccessible during the flight.

(b) Prerequisites

Before permitting the use of any kind of PEDs the operator should ensure compliance with (c) of AMC1 NCC.GEN.130.

(c) Hazard identification and risk assessment

The operator should identify the safety hazards and manage the associated risks following the management system implemented in accordance with ORO.GEN.200. The risk assessment should include hazards associated with:

- (1) PED use during various phases of flight;
 - (2) PED use during turbulence;
 - (3) improperly stowed PEDs;
 - (4) impeded or slowed evacuations;
 - (5) passenger non-compliance, e.g. not deactivating transmitting functions, not switching off PEDs or not stowing PEDs properly;
 - (6) unruly passengers; and
 - (7) battery fire.
- (d) Use of PEDs in the passenger compartment
- (1) Procedures and training

If an operator permits passengers to use PEDs on board its aircraft, procedures should be in place to control their use. These procedures should include provisions for passenger briefing, passenger handling and for the stowage of PEDs. The operator should ensure that all crew members and ground personnel are trained to enforce possible restrictions concerning the use of PEDs, in line with these procedures.
 - (2) Provisions for use
 - (i) The use of PEDs in the passenger compartment may be granted under the responsibility of the operator, i.e. the operator decides which PED may be used during which phases of the flight.
 - (ii) Medical equipment necessary to support physiological functions may be used at all times and does not need to be switched-off.
 - (3) Passenger information, passenger briefing and stowage of PEDs
 - (i) The operator should provide general information on the use of PEDs to the passengers before the flight. This information should specify at least:
 - (A) which PEDs can be used during which phases of the flight;
 - (B) when, which and where PEDs are to be stored; and
 - (C) that the instructions of the crew are to be followed at all times.
 - (ii) In accordance with NCC.OP.140, the use of PEDs should be part of the passenger briefing. The operator should encourage passengers to avoid distraction during such briefings.
 - (iii) In accordance with NCC.OP.135 passengers should be briefed on the operator's procedures concerning the stowage of PEDs. The operator should:
 - (A) identify the phases of flight in which PEDs are to be stowed; and
 - (B) determine suitable stowage locations, taking into account the PEDs' size and weight.
 - (4) In-seat electrical power supplies

Where in-seat electrical power supplies are available for passenger use, the following should apply:

- (i) information cards giving safety instructions should be provided to the passengers;
- (ii) PEDs should be disconnected from any in-seat electrical power supply during taxiing, take-off, approach, landing, and during abnormal or emergency conditions; and
- (iii) flight crew and cabin crew should be aware of the proper means to switch-off in-seat power supplies used for PEDs.

(5) Operator's safety measures during boarding and any phase of flight

- (i) Appropriate coordination between flight crew and cabin crew should be established to deal with interference or other safety problems associated with PEDs.
- (ii) Suspect equipment should be switched off.
- (iii) Particular attention should be given to passenger misuse of equipment.
- (iv) Thermal runaways of batteries, in particular lithium batteries, and potential resulting fire, should be handled properly.
- (v) The pilot-in-command may, for any reason and during any phase of flight, require deactivation and stowage of PEDs.
- (vi) When the operator restricts the use of PEDs, it should be prepared handling special requests to operate a T-PED during any phase of the flight for specific reasons (e.g. for security measures).

(6) Reporting

- (i) Occurrences of suspected or confirmed interference that have potential safety implications should be reported to the competent authority. Where possible, to assist follow-up and technical investigation, reports should describe the offending device, identify the brand name and model number, its location in the aircraft at the time of the occurrence, interference symptoms and the results of actions taken by the crew.
- (ii) The cooperation of the device owner should be sought by obtaining contact details.

(e) Use of PEDs in the flight crew compartment

In the flight crew compartment the operator may permit the use of PEDs, e.g. to assist the flight crew in their duties, when procedures are in place to ensure the following:

- (1) The conditions for the use of PEDs in-flight are specified in the operations manual, otherwise they should be switched off and stowed during all phases of flight.
- (2) The PEDs do not pose a loose-item risk or other hazard.

(3) These provisions should not preclude use of a T-PED (specifically a mobile phone) by the flight crew to deal with an emergency. However, reliance should not be predicated on a T-PED for this purpose.

(f) PEDs not accessible during the flight

PEDs should be switched off, when not accessible for deactivation during flight. This should apply especially to PEDs contained in baggage or transported as part of the cargo. The operator may permit deviation for PEDs for which safe operation has been demonstrated in accordance with AMC1 NCC.GEN.130. Other precautions, such as transporting in shielded metal boxes, may also be used to mitigate associated risks.

GM1 NCC.GEN.130 Portable electronic devices

DEFINITIONS

(a) Definition and categories of PEDs

PEDs are any kind of electronic device, typically but not limited to consumer electronics, brought on board the aircraft by crew members, passengers, or as part of the cargo and that are not included in the approved aircraft configuration. All equipment that is able to consume electrical energy falls under this definition. The electrical energy can be provided from internal sources as batteries (chargeable or non-rechargeable) or the devices may also be connected to specific aircraft power sources.

PEDs fall into three categories:

- (1) Non-intentional transmitters can non-intentionally radiate RF transmissions, sometimes referred to as spurious emissions. This category includes, but is not limited to, ~~computing equipment~~ calculators, cameras, radio receivers, audio and video ~~reproducers~~ players, electronic games and toys. In addition, portable, non-transmitting devices provided to assist crew members in their duties are included in this category. The category is identified as PED.
- (2) Intentional transmitters can radiate RF transmissions on specific frequencies as part of their intended function. In addition, they may radiate non-intentional transmissions like any PED. The term 'transmitting PED' (T-PED) is used to identify the transmitting capability of the PED. Intentional transmitters are transmitting devices such as RF-based remote control equipment, which may include some toys, two-way radios (sometimes referred to as private mobile radio), mobile phones of any type, satellite phones, computers with mobile phone data connection, wireless fidelity (WIFI) or Bluetooth capability. After deactivation of the transmitting capability, e.g. by activating the so-called 'flight mode' or 'flight safety mode', the T-PED remains a PED having non-intentional emissions.
- (3) A controlled PED (C-PED) is subject to administrative control by the operator. This will include, inter alia, tracking the location of the devices to specific aircraft or persons and ensuring that no unauthorised changes are made to the hardware, software or databases. A controlled PED will also be subject to procedures to ensure that it is maintained to the latest amendment state. C-PEDs can be assigned to the category of non-intentional transmitters (PEDs) or intentional transmitters (T-PEDs).

(b) Definition of the switched-off status

Many PEDs are not completely disconnected from the internal power source when switched off. The switching function may leave some remaining functionality e.g. data storage, timer, clock, etc. These devices can be considered switched off when in the deactivated status. The same applies for devices having no transmit capability and operated by coin cells without further deactivation capability, e.g. wrist watches.

(c) A cargo tracking device is a PED attached to or included in airfreight (e.g. in or on containers, palettes, parcels or baggage). If the device is equipped with a wireless data transmitter, it utilises communication standards for portable devices.

(d) Electromagnetic interference (EMI)

The two classes of EMI to be addressed can be described as follows:

(1) Front door coupling is the possible disturbance to an aircraft system as received by the antenna of the system and mainly in the frequency band used by the system. Any PED internal oscillation has the potential to radiate low level signals in the aviation frequency bands. Through this disturbance especially the instrument landing system (ILS) and the VHF omni range (VOR) navigation system may indicate erroneous information which are not detectable by the crew.

(2) Back door coupling is the possible disturbance of aircraft systems by electromagnetic fields generated by transmitters at a level which could exceed on short distance (i.e. within the aircraft) the electromagnetic field level used for the aircraft system certification. This disturbance may then lead to system malfunction.

GM2 NCC.GEN.130 Portable electronic devices

GENERAL

- (a) PEDs can pose a risk of interference with electronically operated aircraft systems. Those systems could range from the electronic engine control, instruments, navigation or communication equipment, autopilots to any other type of avionic equipment on the aircraft. The interference can result in on-board systems malfunctioning or providing misleading information and communication disturbance. This can also lead to an increased workload for the flight crew work.
- (b) Interference may be caused by transmitters being part of the PED's functionality or by unintentional transmissions from the PED. Due to the likely proximity of the PED to any electronically operated aircraft system and the generally limited shielding found in small aircraft, the risk of interference is to be considered higher than for larger aircraft with metal airframes.
- (c) During certification of the aircraft, when qualifying the aircraft functions consideration may only have been made of short-term exposure to a high radiating field, with an acceptable mitigating measure being a return to normal function after removal of the threat. This certification assumption may not be true when operating the transmitting PED on board the aircraft.
- (d) It has been found that compliance with the electromagnetic compatibility (EMC) Directive 2004/108/EC and related European standards, as indicated by the CE

marking, is not sufficient to exclude the existence of interference. A well-known interference is the demodulation of the transmitted signal from GSM (global system for mobile communications) mobile phones leading to audio disturbances in other systems. Similar interferences are difficult to predict during the PED design and protecting the aircraft's electronic systems against the full range of potential interferences is practically impossible. Therefore, not operating PEDs on-board aircraft is the safest option, especially as effects may not be identified immediately but under the most inconvenient circumstances.

GM3 NCC.GEN.130 Portable electronic devices

FIRE CAUSED BY PEDs

A detailed discussion of fire caused by PEDs can be found in CAA UK CAP 789 eEdition 2, eChapter 31, sSection 6, 'Fires in the cabin—caused Cabin Caused by PEDs'¹⁵, inand CAA PAPER 2003/4, 'Dealing With In-Flight Lithium Battery Fires in Portable Electronic Devices', M.J. Lain, D.A. Teagle, J. Cullen, V. Dass¹⁶ and in ICAO Doc 9481, 'Emergency Response Guidance for aircraft Incidents Involving Dangerous Goods'.

GM4 NCC.GEN.130 Portable electronic devices

CARGO TRACKING DEVICES EVALUATION

(a) Safety assessment

Further guidance on performing a safety assessment can be found in AMC 25.1309, SAE ARP 4754, and SAE ARP 4761.

(b) HIRF certification

The type certificate data sheet (TCDS), available on the EASA website for each aircraft model having EASA certification, lists whether the HIRF certification has been performed through a special condition. The operator may contact the type certification holder to gain the necessary information.

(c) Failure mode and effects analysis

Further guidance on performing a failure mode and effects analysis can be found in SAE ARP 4761 and MIL-STD-1629A.

...

3.1.3 Annex VII - Part-NCO (ED Decision 2014/016/R)

...

GM1 NCO.GEN.125 Portable electronic devices

DEFINITIONS

(a) Definition and categories of PEDs

¹⁵ <http://www.caa.co.uk/docs/33/CAP%20789.pdf>.

¹⁶ http://www.caa.co.uk/docs/33/CAPAP2003_04.PDF.

PEDs are any kind of electronic device, typically but not limited to consumer electronics, brought on board the aircraft by crew members, passengers, or as part of the cargo and that are not included in the approved aircraft configuration. All equipment that is able to consume electrical energy falls under this definition. The electrical energy can be provided from internal sources as batteries (chargeable or non-rechargeable) or the devices may also be connected to specific aircraft power sources.

PEDs fall into two categories:

- (1) Non-intentional transmitters can non-intentionally radiate RF transmissions, sometimes referred to as spurious emissions. This category includes, but is not limited to, ~~computing equipment~~ calculators, cameras, radio receivers, audio and video ~~reproducers~~ players, electronic games and toys. In addition, portable, non-transmitting devices provided to assist crew members in their duties are included in this category. The category is identified as PED.
- (2) Intentional transmitters can radiate RF transmissions on specific frequencies as part of their intended function. In addition, they may radiate non-intentional transmissions like any PED. The term 'transmitting PED' (T-PED) is used to identify the transmitting capability of the PED. Intentional transmitters are transmitting devices such as RF-based remote control equipment, which may include some toys, two-way radios (sometimes referred to as private mobile radio), mobile phones of any type, satellite phones, computers with mobile phone data connection, wireless fidelity (WIFI) or Bluetooth capability. After deactivation of the transmitting capability, e.g. by activating the so-called 'flight mode' or 'flight safety mode', the T-PED remains a PED having non-intentional emissions.

(b) Definition of the switched-off status

Many PEDs are not completely disconnected from the internal power source when switched off. The switching function may leave some remaining functionality e.g. data storage, timer, clock, etc. These devices can be considered switched off when in the deactivated status. The same applies for devices having no transmit capability and operated by coin cells without further deactivation capability, e.g. wrist watches.

GM2 NCO.GEN.125 Portable electronic devices

GENERAL

- (a) PEDs can pose a risk of interference with electronically operated aircraft systems. Those systems could range from the electronic engine control, instruments, navigation or communication equipment, autopilots to any other type of avionic equipment on the aircraft. The interference can result in on-board systems malfunctioning or providing misleading information and communication disturbance. These can also lead to an increased workload for the flight crew.
- (b) Interference may be caused by transmitters being part of the PED's functionality or by unintentional transmissions from the PED. Due to the likely proximity of the PED to any electronically operated aircraft system and the generally limited shielding found in small aircraft, the risk of interference is to be considered higher than that for larger aircraft with metal airframes.

- (c) During certification of the aircraft, when qualifying the aircraft functions consideration may only have been made of short-term exposure to a high radiating field, with an acceptable mitigating measure being a return to normal function after removal of the threat. This certification assumption may not be true when operating the transmitting PED on board the aircraft.
- (d) It has been found that compliance with the electromagnetic compatibility (EMC) Directive 2004/108/EC and related European standards, as indicated by the CE marking, is not sufficient to exclude the existence of interference. A well-known interference is the demodulation of the transmitted signal from GSM (global system for mobile communications) mobile phones leading to audio disturbances in other systems. Similar interferences are difficult to predict during the PED design and protecting the aircraft's electronic systems against the full range of potential interferences is practically impossible. Therefore, not operating PEDs on-board aircraft is the safest option, especially as effects may not be identified immediately but under the most inconvenient circumstances.

GM3 NCO.GEN.125 Portable electronic devices

FIRE CAUSED BY PED

A detailed discussion of fire caused by PEDs can be found in CAA UK CAP 789 eEdition 2, eChapter 31, sSection 6, 'Fires in the cabin—causedCabin Caused by PEDs'¹⁷, inand CAA PAPER 2003/4, 'Dealing With In-Flight Lithium Battery Fires in Portable Electronic Devices', M.J. Lain, D.A. Teagle, J. Cullen, V. Dass¹⁸ and in ICAO Doc 9481, 'Emergency Response Guidance for aircraft Incidents Involving Dangerous Goods'.

...

3.1.4 Annex VIII - Part-SPO (ED Decision 2014/018/R)

...

GM1 SPO.GEN.130 Portable electronic devices

DEFINITIONS

- (a) Definition and categories of PEDs

PEDs are any kind of electronic device, typically but not limited to consumer electronics, brought on board the aircraft by crew members, passengers, or as part of the cargo and that are not included in the approved aircraft configuration. All equipment that is able to consume electrical energy falls under this definition. The electrical energy can be provided from internal sources as batteries (chargeable or non-rechargeable) or the devices may also be connected to specific aircraft power sources.

PEDs fall into two categories:

- (1) Non-intentional transmitters can non-intentionally radiate RF transmissions, sometimes referred to as spurious emissions. This category includes, but is not

¹⁷ <http://www.caa.co.uk/docs/33/CAP%20789.pdf>.

¹⁸ http://www.caa.co.uk/docs/33/CAPAP2003_04.PDF.

limited to, ~~computing equipment~~calculators, cameras, radio receivers, audio and video ~~reproducers~~players, electronic games and toys. In addition, portable, non-transmitting devices provided to assist crew members in their duties are included in this category. The category is identified as PED.

- (2) Intentional transmitters can radiate RF transmissions on specific frequencies as part of their intended function. In addition, they may radiate non-intentional transmissions like any PED. The term 'transmitting PED' (T-PED) is used to identify the transmitting capability of the PED. Intentional transmitters are transmitting devices such as RF-based remote control equipment, which may include some toys, two-way radios (sometimes referred to as private mobile radio), mobile phones of any type, satellite phones, computers with mobile phone data connection, wireless fidelity (WIFI) or Bluetooth capability. After deactivation of the transmitting capability, e.g. by activating the so-called 'flight mode' or 'flight safety mode', the T-PED remains a PED having non-intentional emissions.

- (b) Definition of the switched-off status

Many PEDs are not completely disconnected from the internal power source when switched off. The switching function may leave some remaining functionality e.g. data storage, timer, clock, etc. These devices can be considered switched off when in the deactivated status. The same applies for devices having no transmit capability and operated by coin cells without further deactivation capability, e.g. wrist watches.

GM2 SPO.GEN.130 Portable electronic devices

GENERAL

- (a) PEDs can pose a risk of interference with electronically operated aircraft systems. Those systems could range from the electronic engine control, instruments, navigation or communication equipment and autopilots to any other type of avionic equipment on the aircraft. The interference can result in on-board systems malfunctioning or providing misleading information and communication disturbance. These can also lead to an increased workload for the flight crew.
- (b) Interference may be caused by transmitters being part of the PED's functionality or by unintentional transmissions from the PED. Due to the likely proximity of the PED to any electronically operated aircraft system and the generally limited shielding found in small aircraft, the risk of interference is to be considered higher than that for larger aircraft with metal airframes.
- (c) During certification of the aircraft, when qualifying the aircraft functions consideration may only have been made of short-term exposure to a high radiating field, with an acceptable mitigating measure being a return to normal function after removal of the threat. This certification assumption may not be true when operating the transmitting PED on board the aircraft.
- (d) It has been found that compliance with the electromagnetic compatibility (EMC) Directive 2004/108/EC and related European standards as indicated by the CE marking is not sufficient to exclude the existence of interference. A well-known interference is the demodulation of the transmitted signal from GSM (global system for mobile communications) mobile phones leading to audio disturbances in other systems. Similar interferences are difficult to predict during the PED design and

protecting the aircraft's electronic systems against the full range of potential interferences is practically impossible. Therefore, not operating PEDs on-board aircraft is the safest option, especially as effects may not be identified immediately but under the most inconvenient circumstances.

GM3 SPO.GEN.130 Portable electronic devices

FIRE CAUSED BY PED

A detailed discussion of fire caused by PEDs can be found in CAA UK CAP 789 eEdition 2, Chapter 31, Section 6, 'Fires in the cabin caused by PEDs'¹⁹, and CAA PAPER 2003/4, 'Dealing With In-Flight Lithium Battery Fires in Portable Electronic Devices', M.J. Lain, D.A. Teagle, J. Cullen, V. Dass²⁰ and in ICAO Doc 9481, 'Emergency Response Guidance for aircraft Incidents Involving Dangerous Goods'.

...

¹⁹ <http://www.caa.co.uk/docs/33/CAP%20789.pdf>.

²⁰ http://www.caa.co.uk/docs/33/CAPAP2003_04.PDF.

4. Regulatory Impact Assessment (RIA)

4.1. Issues to be addressed

Portable electronic devices (PEDs) are any kind of electronic devices brought on board the aircraft by crew members, passengers or as part of the cargo, and that are not included in the approved aircraft configuration. The use of PEDs on board the aircraft, either by crew members and passengers or included in the cargo, presents a source of uncontrolled electromagnetic emission with potential risk of adverse interference effects to aircraft systems. Consequently, historically there have been strict provisions on their use in an aircraft. In this context, Commission Regulation (EU) No 965/2012 and its amendments, Commission Regulations (EU) No 800/2013 and 379/2014 make it the operators' responsibility to demonstrate that any PED use on-board is safe and does not affect adversely the performance of the aircraft systems and equipment.

On the other hand, portable electronic devices are now part of every day's life. Therefore, the Agency is reviewing the PED policy, recognising the wide proliferation of PEDs and the wish of passengers to use them everywhere and at any time, as well as accounting for new certification standards.

As a first step, the Agency amended AMC1 to CAT.GEN.MPA.140, containing provisions on the expanded use of PEDs. Transmitting devices were not part of this first step. In addition, the Safety Information Bulletin (SIB) 2013-21 was established, containing guidance on the use of non-transmitting devices during any phase of flight.

As a second step, the Agency, with the present rulemaking task, provides proposals with the objective to enable the expanded use of any kind of PEDs by reviewing and amending the operational provisions (included in AMC and GM) related to the PED policy. Thereby, intentional transmitters (T-PEDs) and non-intentional transmitters are considered. Emphasis is given to aircraft technical aspects as well as to cabin safety elements.

4.1.1. Safety risk assessment

In the context of a safety risk assessment, one may, among other issues, observe that:

- aircraft avionic systems are becoming more and more complex while executing more and more functions;
- PEDs are increasing in number and type, and their electromagnetic characteristics are not always precisely known;
- comprehensive electromagnetic testing may not be feasible by an aircraft operator, not only because of insufficient technical knowledge, licensing requirements for radio frequency (RF) transmitters used in testing, human safety concerns during high power level airplane testing, and dynamic changes in cellular frequency spectrums or any other resources, but also because of the huge number of PEDs on the commercial market and of the practical impossibility of replicating all possible electromagnetic configurations in a reasonable time; and
- in any case, if tests were executed, duplicate testing could be required also by other operators.

However, as an overarching principle, the use of PEDs shall only be permitted when it is ensured that they have no negative impact on the safe operation of the aircraft. Consequently, operators need to demonstrate that PEDs do not interfere with on-board

electronic systems and equipment, especially with the aircraft's navigation and communication systems.

4.1.2. Who is affected?

Operators, crew members, authorities responsible for the oversight of operators and aircraft manufactures are affected.

4.1.3. How could the issue/problem evolve?

If the applicable framework is not changed, no safety risk will evolve at a first stage. However, not permitting the use of PEDs on-board may lead to an increasing 'illegal' use by passengers in the future which will increase the safety risk, when specific technical prerequisites concerning the aircraft configuration are not fulfilled. In addition, the 'not-permitting option' is expected to lead to increasing dissatisfaction of passengers.

4.2. 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 of this NPA.

The specific objective of this proposal is to enable the expanded use of any kind of PEDs during various phases of flight by reviewing and updating the operational provisions related to the PED policy.

4.3. Policy options

In order to achieve the above objective, the options below were identified. Thereby, the baseline option (Option 0) is considered as the reference scenario.

Table 1: Selected policy options

Option No	Short title	Description
0	No change	Baseline option (no change to the AMC and GM; no specific risk).
1	Use of PEDs when technical prerequisites are met	Amend the AMC and GM to permit the use of any kind of PEDs, when specific technical prerequisites (certification or interference assessment) have been fulfilled.
2	Use of PEDs with no prerequisites	Amend the AMC and GM to permit the use of any kind of PEDs. No specific technical measures are required as a prerequisite.

4.4. Analysis of impacts

In this paragraph, the major impacts of the options are discussed. For each option the safety, environmental, economic and social impact are considered, as well as proportionality and harmonisation issues.

4.4.1. Safety impact

The baseline option (Option 0) means not permitting the use of T-PEDs. Compared to the situation as of today this implies no change concerning the safety impact. The same holds for Option 1: When technical prerequisites concerning certification or an interference

assessment have been fulfilled, showing that T-PEDs have no negative impact on the safe operation of the aircraft, then the permission to use T-PEDs does not change the safety risk.

Finally, Option 2 means permitting the use of T-PEDs not requiring the fulfilment of any specific technical measures. It can be stated that for the majority of today's passenger transport aircraft, due to advanced certification requirements, the use of T-PEDs has no negative impact on the safe operation. However, for a percentage rate, which cannot be neglected and which especially includes older aircraft, T-PEDs may interfere with on-board electronic and equipment. This number will continuously decrease. Nevertheless, Option 2 would have a substantial negative impact on safety.

4.4.2. Environmental impact

No environmental impacts are expected for any of the options.

4.4.3. Social impact

No social impacts, such as impacts on employment, on labour market, on working hours and working conditions are expected for any of the options. However, with permitting the use of T-PEDs (Options 1 and 2) the overall passenger comfort and satisfaction during flight is expected to increase. This holds, although due to the use of T-PEDs, neighbouring passengers may be annoyed. In this latter context, it might be advisable for operators to implement an appropriate procedure concerning voice calls with mobile phones.

4.4.4. Economic impact

No economic impact is expected for Option 0.

For Option 1 additional costs to operators may be expected due to necessary certification or interference assessment and/or due to possible changes to the aircraft configuration. For both, Options 1 and 2, costs for training of crew members are envisaged. On the other hand, the use of T-PEDs (i.e. Options 1 and 2) could imply an additional source of income for operators when only the on-board network is used. Although it is difficult to estimate the overall economic impact for Options 1 and 2, one can state that the impact on aircraft configuration and crew training will be minor compared to other economic impacts related to the aircraft operation.

4.4.5. General aviation and proportionality issues

No impacts are expected for any of the options.

4.4.6. Impact on 'Better Regulation' and harmonisation

No impacts are expected for any of the options concerning 'Better Regulation'.

Further harmonisation with the current FAA rules and with the expected procedures to be proposed by the ICAO²¹ will be achieved by permitting the expanded use of any kind of PEDs. This holds especially for Option 1, where an appropriate aircraft certification or an interference assessment as a prerequisite is foreseen. As a result, Option 1 is expected to lead to a reduction of passenger conflicts and confusion.

²¹ Currently the International Civil Aviation Organisation is working on an ICAO Circular on the expanded use of PEDs, which is expected to be in line with the FAA rules and with Option 1 of the envisaged Agency's provisions.

Therefore, in the context of 'harmonisation', Options 0 and 2 would mean a negative impact.

4.5. Comparison and conclusion

From the different impacts, which are outlined in paragraph 4.4. of this RIA, the safety impact is the most important one and, consequently, has to be considered first. While Options 0 and 1 are expected not to change the safety risk, Option 2 would have a substantial negative impact on safety. Therefore, Option 2 is not considered any further.

For Option 1, as outlined above, the economic impact for the operator is difficult to be estimated. However, this impact can be considered minor compared to other economic impacts related to the aircraft operation. Therefore, when comparing Options 0 and 1, the economic impact can be neglected.

The further comparison of Option 0 and 1 leads to the following conclusion:

- Option 1 will lead to a positive social impact due to an increased passenger comfort and satisfaction, when the permission to use PEDs is handled in an appropriate manner by the operator.
- Option 1 will lead to better harmonisation with the current FAA rules and with the expected ICAO procedures. As a result of this better harmonisation, a reduction of passenger conflicts and confusion is foreseen.

Therefore, when considering the different evaluating factors, **Option 1 is the preferred option.**

5. References

5.1. Affected regulations

N/A

5.2. Affected AMC and GM

ED Decision 2013/021/R of the Executive Director of the Agency of 23 August 2013 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 – 'Acceptable Means of Compliance and Guidance Material to Part-NCC'. Available at: <http://easa.europa.eu/document-library/agency-decisions>.

ED Decision 2014/015/R of the Executive Director of the Agency of 24 April 2014 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 – 'Acceptable Means of Compliance and Guidance Material to Part-CAT', Issue 2. Available at: <http://easa.europa.eu/document-library/agency-decisions>.

ED Decision 2014/016/R of the Executive Director of the Agency of 24 April 2014 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 – 'Acceptable Means of Compliance and Guidance Material to Part-NCO', Issue 2. Available at: <http://easa.europa.eu/document-library/agency-decisions>.

ED Decision 2014/018/R of the Executive Director of the Agency of 24 April 2014 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 – 'Acceptable Means of Compliance and Guidance Material to Part-SPO'. Available at: <http://easa.europa.eu/document-library/agency-decisions>.

5.3. Reference documents

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), as last amended by Commission Regulation (EU) No 379/2014 of 7 April 2014 (OJ L 123, 24.4.2014, p. 1).

EASA Safety Information Bulletin (SIB) 2013-21: 'Use of portable electronic devices during commercial air transport aircraft operation', 9 December 2013. Available at: <http://easa.europa.eu/easa-and-you/passenger-experience/personal-electronic-devices-ped-board>.

Federal Aviation Administration (FAA): 'Expanding use of passenger portable devices (PEDs)', InFO 13010, 31 October 2013. Available at:

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/media/2013/InFO13010.pdf.

Federal Aviation Administration (FAA): 'FAA aid to operators for the expanded use of passengers PEDs', supplement to InFO 13010, effective date 9 June 2014. Available at:

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/media/2013/InFO13010SUP.pdf.

Portable Electronic Device Aviation Rulemaking Committee (ARC) to the Federal Aviation Administration: 'Recommendations on expanding the use of portable electronic devices during flight', 30 September 2013. Available at:

http://www.faa.gov/about/initiatives/ped/media/PED_ARC_FINAL_REPORT.pdf.