



Advisory Circular

Subject: Use of Transmitting and Non-Transmitting Portable Electronic Devices

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1.0 INTRODUCTION

- (1) This Advisory Circular (AC) is provided for information and guidance purposes. It describes an example of an acceptable means, but not the only means, of demonstrating compliance with regulations, standards and the conditions set out in the referenced exemptions. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

- (1) The purpose of this document is to advise air operators of two national exemptions related to the use of non-transmitting portable electronic devices (PEDs) on board aircraft during take-off, climb, approach and landing, and the use of transmitting portable electronic devices (TPEDs) on board aircraft during the taxi-in to gate, terminal or dock phase of flight.

1.2 Applicability

- (1) This document applies to commercial air operators conducting operations pursuant to Subparts 703, 704 and 705 of the *Canadian Aviation Regulations* (CARs).

1.3 Description of Changes

- (1) The document has been revised to include guidance on the use of non-transmitting PEDs during take-off, climb, approach and landing.

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

- (1) It is intended that the following reference materials be used in conjunction with this document:
 - (a) *Aeronautics Act* (R.S., 1985, c. A-2);
 - (b) Part VI, Subpart 02 of the *Canadian Aviation Regulations* (CARs) — *Operating and Flight Rules*;
 - (c) Part VII, Subpart 03 of the CARs — *Air Taxi Operations*;
 - (d) Part VII, Subpart 04 of the CARs — *Commuter Operations*;
 - (e) Part VII, Subpart 05 of the CARs — *Airline Operations*;
 - (f) Standard 723 of the CARs — *Air Taxi*;
 - (g) Standard 724 of the CARs — *Commuter Operations*;
 - (h) Standard 725 of the CARs — *Airline Operations*;
 - (i) Transport Canada Summary Report, 2005-10-29 — *Risk Management On The Use Of Transmitting Portable Electronic Devices (TPEDs) During Taxi-In Phase*;
 - (j) Federal Aviation Administration Advisory Circular (FAA AC) 91.21-1B — *Use of Portable Electronic Devices Aboard Aircraft*;
 - (k) A Report from the Portable Electronic Devices Aviation Rulemaking Committee to the Federal Aviation Administration, 09/30/13 — *Recommendations on Expanding the Use of Portable Electronic Devices During Flight*;
 - (l) FAA Notice 8900.240, 10/31/13 — *Expanded Use of Passenger Portable Electronic Devices (PED)*;

- (m) FAA Information for Operators (InFO) 13010, 10/31/13 — *Expanding Use of Passenger Portable Electronic Devices (PED)*;
- (n) Supplement to FAA InFO 13010, 10/31/13 — *FAA Aid to Operators for the Expanded Use of Passengers PEDs*;
- (o) United Kingdom Civil Aviation Authority (UK CAA), Civil Aviation Publication (CAP) 756, 11/2005 — *Portable Electronic Device Generated Electro-magnetic Fields on Board a Large Transport Aeroplane*;
- (p) EASA Safety Information Bulletin (SIB) 2013-21, 2013-12-09 — *Use of Portable Electronic Devices during Commercial Air Transport Aircraft Operation*;
- (q) RTCA document no. DO-160E — *Environmental Conditions and Test Procedures for Airborne Equipment*;
- (r) RTCA document no. DO-294B — *Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft*;
- (s) RTCA document no. DO-307 — *Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance*.

2.2 Cancelled Documents

- (1) Not applicable.
- (2) By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void.

2.3 Definitions and Abbreviations

- (1) The following **definitions** are used in this document:
 - (a) **Airplane mode:** means a setting available on many mobile phones, smartphones and other electronic devices that, when activated, suspends many of the device's signal transmitting functions, thereby disabling the device's capacity to place or receive calls or use text messaging – while still permitting use of other functions that do not require signal transmission (e.g., games, built-in camera, MP3 player).
 - (b) **Critical phases of flight:** for the purpose of this AC, includes take-off, climb, approach and landing;
 - (c) **Portable electronic device:** means any lightweight, electrically-powered equipment. These devices are typically consumer electronic devices capable of communication, data processing and/or utility. Examples range from handheld, lightweight electronic devices such as tablets, e-readers, and smartphones to small devices such as MP3 players and electronic toys. *Note: the definition of PED is intended to encompass transmitting and non-transmitting PEDs.*
 - (d) **Non-transmitting portable electronic device:** means a portable electronic device that has the device's radio frequency transmitting functions turned off or is in airplane mode with the Wi-Fi capability also turned off.
 - (e) **Transmitting portable electronic device:** means a PED that contains an intentional transmitter. Intentional transmitters may include devices enabled with cellular technology, wireless radio frequency network devices, and other wireless-enabled devices such as remote control equipment (which may include toys), two-way radios, cell phones and satellite phones.

- (2) The following **abbreviations** are used in this document:
- (a) **AED**: automated external defibrillator;
 - (b) **ARC**: Aviation Rulemaking Committee;
 - (c) **ATAC**: Air Transport Association of Canada;
 - (d) **ATC**: air traffic control;
 - (e) **CAR**: Canadian Aviation Regulation;
 - (f) **CASS**: Commercial Air Service Standard;
 - (g) **EMC**: electromagnetic compatibility;
 - (h) **EMI**: electromagnetic interference;
 - (i) **FAA**: Federal Aviation Administration;
 - (j) **FADEC**: full authority digital electronic control;
 - (k) **FCC**: Federal Communications Commission;
 - (l) **FDR/CVR**: flight data recorders/cockpit voice recorders;
 - (m) **MPED**: medical portable electronic device;
 - (n) **PED**: portable electronic device;
 - (o) **RTCA**: originally known as Radio Technical Commission for Aeronautics, now referred to as RTCA Inc.;
 - (p) **TCCA**: Transport Canada Civil Aviation;
 - (q) **TPED**: transmitting portable electronic device;
 - (r) **TTL**: Technical Team Lead; and
 - (s) **UK CAA**: United Kingdom Civil Aviation Authority.

3.0 BACKGROUND

3.1 Transmitting and Non-Transmitting Portable Electronic Devices

- (1) PEDs fall into two main categories: non-intentional transmitters and intentional transmitters. The first category may include, but is not limited to, computing equipment, cameras, radio receivers and electronic games and toys. The second category contains transmitting devices such as remote control equipment (which may include toys), two-way radios, cell phones and satellite phones. Electronic devices that are intentional transmitters may induce interference directly into aircraft equipment, wiring or components and have the ability to affect proper functioning of aircraft systems.
- (2) Current regulatory requirements for the operation of commercial aircraft prohibit the use of TPEDs onboard an aircraft when the engines are running, and where the device may impair the functioning of the aircraft systems or equipment.
- (3) In Canada, the onus for determining if passenger-operated electronic devices will cause interference is placed on the operator of the aircraft, as there are no airworthiness standards for the manufacture of passenger-operated devices, no maintenance standards and no performance standards in relation to their use on an aircraft.
- (4) Even PEDs that do not intentionally transmit signals can emit unintentional radio energy. This energy may affect aircraft safety because the signals can occur at the same frequencies used by the aircraft's highly sensitive communications, navigation, flight control and electronic equipment.

3.2 Development of a National Exemption on the Use of Non-Transmitting PEDs During Critical Phases of Flight

- (1) Use of passenger-operated non-transmitting PEDs during take-off, climb, approach and landing is currently prohibited by the CARs. However, based on documents developed by RTCA Inc. and information from the Federal Aviation Administration (FAA) Aviation Rulemaking Committee (ARC), Transport Canada Civil Aviation (TCCA) believes that sufficient mitigation can occur to allow for safe operation of non-transmitting PEDs during take-off, climb, approach and landing, otherwise known as critical phases of flight.
- (2) On January 7, 2013, the Administrator for the FAA established the PED ARC to provide a forum for the United States aviation community and government regulatory groups to review the issue of use of non-transmitting PEDs during critical phases of flight. The ARC was tasked with making recommendations to further clarify and provide guidance on allowing additional PED usage without compromising the continued safe operation of the aircraft.
- (3) The ARC reviewed current available data submitted by the FAA, other federal agencies, including the Federal Communications Commission (FCC), industry associations, and ARC member subject matter experts. The ARC also reviewed current guidance material and information on PEDs, including documents developed by the FAA, RTCA Inc., and FCC. The ARC spent nine months completing a report that details the considerations to expand PED use and outlines recommendations and suggested guidance for the FAA and operators to follow.
- (4) TCCA has reviewed the ARC's report and its recommendations and has developed a national exemption to allow air operators to expand passenger use of non-transmitting PEDs on board aircraft during critical phases of flight.
- (5) The first condition of this exemption requires steps to be taken by the air operator prior to exercising the relief provided by the exemption. It requires that for each make and model of aircraft used by the air operator on which the air operator intends to permit the use of non-transmitting PEDs during any or all of the take-off, climb, approach and landing phases of flight, take the necessary action to ensure that the operation of the non-transmitting PED does not have any adverse effects on the operation of the aircraft or its equipment during those phases of flight by conducting testing to determine the aircraft tolerance to non-transmitting PED use including, the level of electromagnetic interference (EMI) or any other form of signal, that could be emitted from the kind of non-transmitting PED the air operator intends to permit during those phases of flight. Guidance on the testing of non-transmitting PEDs for use during critical phases of flight is included in section 4.2.1 of this AC.

3.3 Development of a National Exemption on the Use of TPEDs During Taxi-in to Gate, Terminal or Dock Phase of Flight

- (1) Currently, the FAA permits passengers to use cell phones while the aircraft is on the ground at the gate. Furthermore, the air operator may permit their usage once the aircraft is off the active runway and taxiing to the gate, terminal or dock, if the operation of the cell phones is shown to have no implication on the safety of the aircraft. However, the use of TPEDs is prohibited during all other phases of flight. Other countries and civil aviation authorities have different operating rules and policies, such as the United Kingdom Civil Aviation Authority (UK CAA), which requires that TPEDs be switched off from the time the aircraft doors are closed until the end of the flight when a passenger door has been opened.
- (2) The Air Transport Association of Canada (ATAC) asked TCCA to take action to allow passengers to use PEDs such as cell phones and Blackberries during the taxi-in to the gate, terminal or dock (also referred to as the "taxi-in") phase of flight. TCCA conducted a risk assessment to evaluate this request.
- (3) The risk assessment findings showed that cell phone use during the taxi-in phase could be mitigated to an acceptable level of safety provided that certain conditions were met. One of the

conditions requires that the air operator demonstrate that there is no impact on safety by conducting a test using various TPEDs and aircraft systems.

- (4) Based on the findings of the risk assessment, a national exemption was issued to allow air operators to permit the use of TPEDs during the taxi-in phase until the necessary regulatory changes are made. Air operators electing to use the national exemption must first complete the mandatory testing for the aircraft types in their fleet and then establish appropriate operational procedures. If an air operator chooses to permit the use of TPEDs on the taxi-in phase, regulatory requirements regarding the stowage of carry-on baggage must not be violated. It should be noted that the responsibility for permitting passenger use of TPED technology lies solely with the operator. Guidance on the testing of TPEDs for use during the taxi-in phase of flight is included in section 4.2.2 of this AC.

4.0 OPERATIONAL REQUIREMENTS

- (1) Section 602.08 of the CARs states that no air operator shall permit the use of a PED on board an aircraft, where the device may impair the functioning of the aircraft systems of equipment, and that no person shall use a PED on board an aircraft except with the permission of the operator of the aircraft.
- (2) Sections 703.38, 704.33 and 705.40 of the CARs require that air operators establish procedures for the use of PEDs onboard aircraft that meet the *Commercial Air Service Standards* (CASS) and are specified in the air operator's company operations manual.
- (3) Sections 703.39/723.39, 704.34/723.34 and 705.43/725.43 of the CARs and related standards require that passengers be informed of the air operator's policy pertaining to the use of electronic devices during the pre-flight safety briefing. Methods must be established to inform the passengers of permissible times and conditions for use.
- (4) If an air operator allows the use of TPEDs during the taxi-in phase, procedures must be established to control their use and to comply with regulations pertaining to the stowage of carry-on baggage.
- (5) If an air operator allows the use of non-transmitting PEDs during critical phases of flight, procedures must be established to control their use and to comply with regulations pertaining to the stowage of carry-on baggage. Air operators should consider the size and weight of the PEDs that are acceptable to be secured either on their person or in an approved stowage location and implement procedures for stowage of all loose PEDs during the take-off, climb, approach or landing (as applicable) phases of flight in order to prevent personal injury from projectiles.
- (6) In accordance with regulatory requirements, if interference from a PED or TPED is suspected, the operator of an aircraft shall prohibit the use of the device. The operator must have established procedures to terminate the operation of PEDs and TPEDs suspected of causing interference with aircraft systems.
- (7) In accordance with regulatory requirements, where interference with the aircraft systems or equipment is suspected from use of a PED or TPED, crew members shall:
 - (a) confirm passenger use of electronic device(s);
 - (b) instruct passenger(s) to terminate the use of the device;
 - (c) prohibit the use of suspected electronic device(s); and
 - (d) recheck the aircraft systems and equipment.

4.1 Criteria for Safe Operation of Cell Phones

- (1) Existing regulations for commercial aircraft require that all TPEDs be turned off and properly stowed when the aircraft engines are running. Some phones and other wireless devices have a

special “flight” or “airplane” mode that turns off just the wireless radio parts of the device, for safe use on an aircraft where radio transmitters are not allowed. Therefore, “airplane” mode allows the user to safely use the non-wireless functions of a phone (such as music, games or organizer functions) on an aircraft during flight.

4.2 Testing

- (1) The onus for determining if passenger-operated electronic devices will cause interference is placed on the air operator.

4.2.1 Testing of Non-Transmitting PEDs for Use During Critical Phases of Flight

- (1) The determination of whether a non-transmitting PED may impair the functioning of the aircraft’s systems or equipment will be made by the air operator. It is up to the air operator to select a means of determination. FAA InFO 13010SUP, “FAA Aid to Operators for the Expanded Use of Passenger PEDS”, dated October 31, 2013, provides suitable guidance for evaluating the compatibility of an aircraft for use with non-transmitting PEDs.
- (2) FAA InFO 13010SUP directs readers seeking additional guidance to FAA offices; however, Canadian air operators and TCCA staff should first contact their TCCA Regional Aircraft Certification Technical Team Leads (TTLs) for further guidance regarding the procedure in InFO 13010SUP.

4.2.2 Testing of TPEDs for Use During Taxi-in Phase of Flight

- (1) Normally, the air operator would determine the safety of TPED operation by performing an electromagnetic compatibility (EMC) test. The EMC test is based on the development of a matrix listing the victim and sources of electromagnetic interference. In this case, all equipment that is powered and normally used during the taxi-in phase would be listed as a victim, while the sources would be the various cell phone technologies. The following provides acceptable means for assessing the effects on aircraft systems and their operation during the taxi-in phase:
 - (a) There are two acceptable approaches for demonstrating the safe operation of cell phones as follows:
 - (i) A test that may be performed using cell phones representing different technologies and different manufacturers; or
 - (ii) Usage of simulated test waveforms representing the various cell phone technologies in accordance with the information provided in RTCA DO-294B (Appendix 6, Section 6.D).
 - (b) If the operator chooses the method identified in (a)(i) above, 90% of the seats should be populated with cell phones in order to address the multiple equipment factor.
 - (c) The cell phones should be set to transmit at their maximum power. The reason for usage of maximum power is based on certain cell phone technology where operation may start at a low power and then, if connection to a ground tower is not successfully established, power would then automatically increase to its maximum level in order to ensure a successful connection.
 - (d) The test plan must document the aircraft configuration, model, and tail number or registration. For various interior configurations or variations in equipment or antenna locations, an analysis should be carried out to ensure that the test results are still valid.
 - (e) Test equipment: The test plan must identify the types of cell phones to be used for testing method (a)(i) or the test antenna, power amplifier, power levels, modulation and test frequencies to be used for (a)(ii).
 - (f) Test procedures: A matrix should be prepared showing the source (cell phones or test waveform) and the systems that are powered during the taxi-in phase. With the aircraft doors closed and the engines running, the cell phones will be set in the transmitting mode

while placed on the various seats. If simulated signals are used in accordance with (a)(ii) above, the transmitting antenna should be moved inside the aircraft, specifically near windows and doors close to external antennas that are used for communications during the taxi-in phase. For either method, aircraft systems that should be monitored include the cabin intercom, the flight crew audio system, air traffic control (ATC) communications systems, the aural and display warning and caution system, engine control (e.g. full authority digital electronic control (FADEC) equipped engines), and flight data recorders/cockpit voice recorders (FDR/CVR). A check mark may be inserted into the matrix (table) if there is no noticeable effect on each system. However, any noticeable effect on any aircraft system should be recorded and explained clearly in the table.

- (g) The test report will address all anomalies, either by mitigation, or by presenting technical measures that have been put in place (e.g. additional shielding, rerouting of certain wiring bundles, etc.).

4.2.3 Reporting Interference from a PED or TPED

- (1) In accordance with regulatory requirements, the pilot-in-command shall report incidents of PED interference and include the following information in the report:
 - (a) Flight Information – aircraft type, registration date and UTC time of incident, aircraft location (VOR bearing/DIST/LAT/LONG), altitude, weather conditions, pilot name and telephone number;
 - (b) Description of Interference – description of effects on cockpit indicators, audio or systems, including radio frequency, identification, duration, severity and other pertinent information;
 - (c) Action taken by the Pilot/Crew to Identify Cause or Source of Interference;
 - (d) Identification of PED – description of device, brand name, model, serial number, mode of operation, device location (seat location), and regulatory approval number (FCC/other);
 - (e) Identification of User – name and telephone number of passenger operating the device; and
 - (f) Additional Information – as determined pertinent by the crew.
- (2) Reports of PED interference shall be submitted. The reports should be submitted to the Director, Policy and Regulatory Services, Aviation Safety Intelligence, Civil Aviation, Transport Canada, Transport Canada Building, Place de Ville, Ottawa, Ontario, K1A 0N8.

4.2.4 Medical Portable Electronic Devices

- (1) Medical portable electronic devices (MPEDs), such as automated external defibrillators (AEDs), and airborne patient medical telemonitoring equipment, should be designed and tested in accordance with section 21, Category M, of RTCA/DO-160, current edition. MPEDs that test within the emission levels contained in this RTCA document, in all modes of operation (i.e. standby, monitor and/or transient monitor mode), may be used onboard the aircraft without any further testing by the operator.

5.0 CREW MEMBER TRAINING

- (1) The initial and recurrent crew member training on the company's policy and procedures for the use of non-transmitting PEDs and TPEDs should include the following.
 - (a) Initial Training – should include, without being limited to, the following components:
 - (i) the company policy and how to interpret it;
 - (ii) awareness of the potential impact on aircraft systems from improper use of PEDs and TPEDs;

- (iii) the various types/classes of technologies that may be encountered and how to correlate these to the company PED and TPED policies; and
 - (iv) within each technology class, examples of the various device types available and typical logos identifying certain standards or operating modes.
- (b) Recurrent Training - should include, without being limited to, the following components:
- (i) latest version of the operator's PED and TPED policies and details of any revisions to the policy;
 - (ii) recent examples of known interference with aircraft systems, if applicable; and
 - (iii) recent changes of technologies that may be seen in the field.

Note 1:

Air operators should take Transport Canada TP 12296E—Flight Attendant Training Standard into consideration when developing training programs for flight attendants relating to the use of electronic devices.

Note 2:

Air operators should also take FAA InFO 13010, "Expanding Use of Passenger Portable Electronic Devices (PED)", dated October 31, 2013, into consideration when developing or amending procedures related to the use of non-transmitting PEDs during critical phases of flight.

6.0 CONCLUSION

- (1) Air operators should take the content of this AC into account when developing or amending procedures related to the use of non-transmitting PEDs on board aircraft during critical phases of flight, as well as the use of TPEDs during the taxi-in phase of flight.
- (2) Air operators can access the national exemption to permit the use of non-transmitting PEDs on board aircraft during critical phases of flight, as well as the national exemption to permit the use of TPEDs on board aircraft during the taxi-in to gate, terminal or dock phase of flight at the following TCCA exemption search link: <http://wwwapps2.tc.gc.ca/saf-sec-sur/2/exemptions/>.

7.0 INFORMATION MANAGEMENT

- (1) Not applicable.

8.0 DOCUMENT HISTORY

- (1) Advisory Circular (AC) 700-005 **Issue 02**, RDIMS 6623530 (E), 6735086 (F), 2011-07-06 — *Use of Transmitting Portable Electronic Devices.*
- (2) Advisory Circular (AC) 700-005 **Issue 01**, RDIMS 2239505 (E), 3689337 (F) 2008-04-28 — *Use of Transmitting Portable Electronic Devices.*
- (3) Commercial and Business Aviation Advisory Circular (CBAAC) 0106R, RDIMS 14475 (E and F), 2001-07-04 — *Use of Portable Passenger Operated Electronic Devices Onboard Aircraft and Occurrence Reporting.*

9.0 CONTACT OFFICE

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Transport Canada documents or intranet pages mentioned in this document are available upon request through the Contact Office.