



Advisory Circular

Subject: Use of 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 provide guidance to operators on the expected use of portable electronic devices (PEDs) during all phases of flight. It applies to all types of PEDs, whether intentional or non-intentional transmitters, transmitting or non-transmitting PEDs. This document describes the testing and reporting typically used to establish if a PED may adversely affect the operation of an aircraft or the functioning of the aircraft's systems or equipment.

1.2 Applicability

- (1) This AC applies to Canadian air operators holding an Air Operator Certificate (AOC) issued under subparts 703, 704, 705 of the *Canadian Aviation Regulations* (CARs). This AC can serve as a reference for other operators when determining which PEDs are allowed to be used on their aircraft.
- (2) This document is also applicable to all Transport Canada Civil Aviation (TCCA) employees, and to individuals and organizations when they are exercising privileges granted to them under an External Ministerial Delegation of Authority. The content of this document is also available to the aviation industry at large for information purposes.

1.3 Description of changes

- (1) The document has been revised to incorporate the amendment to the definition of a portable electronic device (PED) in Subsection 101.01(1) of the CARs.
- (2) The document has been revised to incorporate guidance changes resulting from the amendments to the CARs, Parts I, VI, and VII — Portable Electronic Devices.

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 2 of the *Canadian Aviation Regulations* (CARs) — Operating and Flight Rules
 - (c) Division II.1 of CARs Subpart 700 — Portable Electronic Devices
 - (d) Transport Canada Advisory Circular (AC) 700-020, Issue 03, 2018-03-28 — Electronic Flight Bags
 - (e) Transport Canada Civil Aviation Safety Alert (CASA) No. 2021-08 - Potential Risk of Interference of 5G Signals on Radio Altimeter, 2021-12-23

- (f) Innovation, Science and Economic Development Canada (ISED) Standard Radio System Plan (SRSP) 520, Issue 03 -Technical Requirements for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3900 MHz
- (g) International Civil Aviation Organization (ICAO) Circular 340 AN/198 — Guidelines for the Expanded Use of Portable Electronic Devices
- (h) Federal Aviation Administration (FAA) Advisory Circular (AC) 91.21-1D — Use of Portable Electronic Devices Aboard Aircraft
- (i) FAA AC 20-164() — Designing and Demonstrating Aircraft Tolerance to Portable Electronic Devices
- (j) FAA 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
- (k) FAA Information for Operators (InFO) 13010, 10/31/13 — Expanding Use of Passenger Portable Electronic Devices (PED)
- (l) Supplement to FAA InFO 13010, 10/31/13 — FAA Aid to Operators for the Expanded Use of Passengers PEDs
- (m) EASA Safety Information Bulletin (SIB) 2013-21, 2013-12-09 — Use of Portable Electronic Devices during Commercial Air Transport Aircraft Operation
- (n) European Organisation for Civil Aviation Equipment (EUROCAE) ED 130() — Guidance for the use of Portable Electronic Devices (PEDs) on Board Aircraft
- (o) Radio Technical Commission for Aeronautics (RTCA)/DO-160()— Environmental Conditions and Test Procedures for Airborne Equipment
- (p) RTCA/DO-294() — Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDS) on Aircraft
- (q) RTCA/DO-307() — Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance
- (r) RTCA/DO-363() — Guidance for the Development of Portable Electronic Devices (PED) Tolerance for Civil Aircraft
- (s) RTCA Paper No. 274-20/PMC-2073 - Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter
- (t) International Telecommunication Union (ITU) Recommendation ITU-R M.2059-0 Operational and technical characteristics and protection criteria of radio altimeters utilizing the band 4 200-4 400 MHz

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 smartphones, tablets 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 the use of other functions that do not require signal transmission (e.g., music/podcast player, games, built-in camera).

- (b) **Critical phases of flight:** for the purpose of this AC, includes take-off, climb, approach and landing.
- (c) **Medical portable electronic device:** a medical portable electronic device (MPED), is designed and tested in accordance with section 21, Category M, of RTCA/DO-160(). MPEDs are now commonly configured with transmitting capabilities to allow medical providers to remotely monitor the equipment, while also enabling users to control and monitor their own devices. MPEDs may be used onboard the aircraft without any further testing by an operator if test results are within the acceptable emission levels in all modes of operation (i.e., standby, monitor and/or transient monitor mode). MPEDs include automated external defibrillators (AEDs), specifically portable oxygen concentrators (POC), ventilators, respirators, continuous positive airway pressure (CPAP) machines and airborne patient medical telemonitoring equipment.
- (d) **Non-transmitting portable electronic device:** means a portable electronic device that is not equipped with a radio frequency transmitting function or a portable electronic device that has all of the device's radio frequency transmitting functions turned off or is in airplane mode with the transmitting capability also turned off
- (e) **Portable electronic device:** means any kind of electronic device that is brought on board an aircraft by any person, or as part of the cargo, and that is not included in the approved aircraft configuration. These devices are typically consumer electronic devices capable of communication, data processing and/or utility and which consume electrical energy from internal sources such as batteries, or which are powered externally by aircraft electrical sources. Examples range from handheld, lightweight electronic devices such as laptops, tablets and smartphones to smaller devices such as smart watches and fitness trackers.

Note: the definition of PED is intended to encompass both transmitting and non-transmitting PEDs.
- (f) **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, smart phones.

(2) The following **abbreviations** are used in this document:

- (a) **CARs:** *Canadian Aviation Regulations*
- (b) **CVR:** Cockpit Voice Recorder
- (c) **EMC:** Electromagnetic Compatibility
- (d) **FAA:** Federal Aviation Administration
- (e) **FDR:** Flight Data Recorder
- (f) **MPED:** medical portable electronic device
- (g) **PED:** portable electronic device
- (h) **RTCA:** originally known as Radio Technical Commission for Aeronautics, now referred to as RTCA Inc.
- (i) **TCCA:** Transport Canada Civil Aviation

3.0 Background

3.1 Portable electronic devices

- (1) PEDs fall into two main categories: non-intentional transmitting PEDs and intentional transmitting PEDs. Non-intentional transmitting PEDs include portable medical equipment, cameras, e-readers and some electronic games and toys. Intentional transmitting devices include smartphones, tablets, smart watches, remotely controlled leisure equipment (e.g., drones, toys).
- (2) Both intentional and non-intentional transmitting devices may induce interference directly into aircraft equipment or aircraft systems and could affect their proper functioning.

3.2 Regulatory framework

- (1) The previous regulatory requirements under Section 602.08 of the CARs prohibited operators from permitting the use of a PED onboard an aircraft where the device may have impaired the functioning of the aircraft's systems or equipment.
- (2) Several aviation safety risk assessments conducted by Transport Canada related to the expanded use of PEDs on board commercial aircraft began in 2005 and continued until the late 2010s. The results concluded that there was low risk of PED interference with aircraft systems, culminating in the issuance of national exemptions permitting the use of transmitting PEDs during all phases of flight.
- (3) The exemptions were founded on conditional requirements that all air operators ensure that all aircraft makes and types in their fleet were appropriately tested to ensure that PEDs did not have any adverse effects (e.g., electromagnetic interference) on the operation of the aircraft or its equipment during all phases of flight.
- (4) The 2019 amendments to CARs subsection 602.08(1) clarify the nature of the impairment that PEDs may cause, while the amendments to Part VII repealed subsections 703.38(3), 704.33(5), and 705.40(4).

4.0 Operational requirements

- (1) Section 602.08 of the CARs states that no operator of an aircraft shall permit the use of a PED on board an aircraft if the use of the PED could adversely affect the operation of the aircraft or the functioning of the aircraft's systems or equipment.
- (2) Additionally, Section 700.12 of the CARs is applicable to air taxi operations (Subpart 703), commuter operations (Subpart 704), and airline operations (Subpart 705) relating to Canadian commercial air services.
- (3) The provisions mandate air operators to keep records that document the aircraft for which they will allow the use of PEDs (i.e., type, series, and model of aircraft), and their demonstration that the use of PEDs will not adversely affect the aircraft's system or equipment during all phases of flight including critical phases.
- (4) As the use of PEDs that transmit and receive on 5G frequencies continues to increase, it is advisable for operators to assess the impact of this technology on their operations, including potential radio altimeter (RA) performance degradation. Collaboration with aircraft and RA manufacturers, as well as PED manufacturers, in evaluating the risks posed by the 5G environment and devices during air operations is essential.
- (5) Air operators must keep the most recent records on how they satisfy the requirements and submit those records to the Minister upon request. If interference from a PED is suspected, air operators must immediately prohibit the use of the PED in question and, as soon as practicable, submit to

the Minister a report of the adverse effects on the operation of the aircraft or the functioning of the aircraft's systems or equipment that are caused, or possibly caused, by the use of the PED. Section 6.1 of this document provides reporting information.

5.0 Means of validation

- (1) The air operator is responsible for validating if a PED adversely affects the operation of the aircraft or the functioning of the aircraft's systems or equipment during any phase of the flight. In addition to regulatory requirements of Section 602.08 of the CARs, air operators operating under Subparts 703, 704, and 705 of the CARs must meet additional performance requirements (e.g., record keeping of validation and PED-allowable aircraft) to permit the use of PEDs.
- (2) Air operators can use acceptable methods provided in Appendix A of this AC, or equivalent methods. If the operator lacks the personal knowledge of these methods, the operator should consult an appropriately trained and knowledgeable expert to conduct the validation.

5.1 Aircraft designed and certified PED tolerant

- (1) Aircraft manufacturers with access to aircraft electronic system qualifications and aircraft radio receiver antenna installation data may demonstrate that an aircraft meets the requirements of RTCA/DO-307A, as described in Appendix A.
- (2) Air operators may obtain statements/reports of demonstration from aircraft manufacturers to substantiate aircraft PED tolerance. Additionally, air operators may also use the RTCA/DO-307A methods in demonstrating PED tolerance of their aircraft. Aircraft with TCCA-approved systems such as Wireless Fidelity (Wi-Fi), Bluetooth, Onboard Mobile Telecommunications System (OMTS), and airborne internet systems (AIS) are considered PED-tolerant for PEDs used with the installed system. If an aircraft type and model have demonstrated tolerance for both transmitting and non-transmitting PEDs, the operator may allow PED use during all phases of flight on this aircraft model.

5.2 Aircraft not designed and certified PED tolerant

- (1) If an air operator does not have a designed and certified PED-tolerant aircraft and chooses not to test its aircraft fleet types according to RTCA/DO-307A or obtain supporting documentation from the aircraft manufacturer, an air operator may choose to conduct a safety risk assessment following the process in RTCA/DO-363. The operator's assessment should evaluate the avionics configuration of its fleet and failure modes of communication, navigation, surveillance, and other electronic systems with respect to electromagnetic interference. This assessment ultimately must outline mitigations and controls the operator needs to adopt to expand PED use into various phases of flight.

5.3 Testing of PEDs for use during any phase of flight

- (1) The determination of whether a transmitting and/or non-transmitting PED may impair the functioning of the aircraft's systems or equipment will be made by the operator. It is up to the 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 transmitting and/or non-transmitting PEDs.
- (2) Typically, the operator would determine the safety of PED operations by performing an electromagnetic compatibility (EMC) test for a specific phase of flight, including:
 - (a) Parked

- (b) Taxi out
 - (c) Takeoff & departure
 - (d) Climb
 - (e) Cruise
 - (f) Descent
 - (g) Approach
 - (h) Landing & taxi in
- (3) The EMC test is based on the development of a matrix listing the victims and sources of electromagnetic interference. All equipment that is powered and normally used during a phase would be listed as a victim, while the sources would be various PEDs in use. 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 PEDs follows:
 - (i) A test that may be performed using PEDs representing different technologies and different manufacturers (e.g., cell phones, tablets, smart watches); or
 - (ii) Usage of simulated test waveforms representing the various cell phone technologies in accordance with the information provided in RTCA/DO-294
 - (b) If the operator chooses the method identified in (a)(i) above, 90% of the seats should be populated with PEDs to address a multiple equipment factor.
 - (c) When applicable, the PEDs should be set to transmit at their maximum power (e.g., cellular phones). The reason for the usage of maximum power is based on certain cell phone technology where the operation may start at low power and then if a connection to a ground tower is not successfully established, power would automatically increase to its maximum level 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 PEDs 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 (e.g., 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 PEDs will be set in 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 interphone, 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) FAA InFO 13010SUP directs readers seeking additional guidance to FAA offices; however, Canadian operators and TCCA staff should instead contact their Principal Operations Inspector (POI) for further guidance regarding the procedure in InFO 13010SUP.

6.0 Operator requirements

- (1) In accordance with regulatory requirements, if interference from a PED is suspected, the operator of the aircraft shall prohibit the use of the device. The operator should have established procedures to terminate the operation of the PED suspected of causing interference with aircraft systems.
 - (a) Where interference with the aircraft systems or equipment is suspected from use of a PED, crew members shall:
 - (i) confirm passenger(s) use of electronic device(s);
 - (ii) instruct passenger(s) to terminate the use of the device(s);
 - (iii) prohibit the use of suspected electronic device(s); and
 - (iv) recheck the aircraft systems and equipment.

6.1 Reporting interference from a PED

- (1) CARs Subparts 703, 704, and 705 air operators are required to report PED-related interference incidents. Incident reporting for operators of other aircraft is optional. The following information may be included 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 flight deck indicators, audio or on-board electronic systems and equipment, including radio frequency, identification, duration, severity and other pertinent information;
 - (c) Crew response and actions taken to identify cause or source of interference;
 - (d) Identification of the PED – description of the device, brand name, model, serial number, mode of operation, device location (e.g., seat location, flight deck, galley), user of the PED (e.g., passenger, crew member), use of the PED (e.g., personal device, electronic flight bag, cabin electronic flight bag), and regulatory approval number (Federal Communications Commission (FCC), International Mobile Equipment Identity (IMEI) or any other type of certification);
 - (e) Identification of user – name and contact information of user operating the PED;
 - (f) Additional information, including information about any Notice to Air Missions (NOTAM) and 5G interference on the airport of occurrence – as determined pertinent by the crew.
- (2) Reports of PED interference can be submitted to the Chief, Commercial Flight Standards Division (AARTF) by e-mail at AARTFinfo-InfoAARTF@tc.gc.ca.

6.2 C-Band (5G) interference with radio altimeters

- (1) '5G' is the fifth-generation technology standard for broadband cellular phone networks. These networks use a band in the frequency spectrum which currently operates in Canada at frequencies 3450-3900 MHz. These frequency spectrums are adjacent to those used by aircraft Radio Altimeters (RAs) which operate between 4200-4400 MHz. RTCA Paper No. 274-20/PMC-2073 - *Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Operations* provided an evaluation of RA performance and interference from expected 5G emissions (terrestrial and mobile) and an assessment of the risks of such interference occurring and its impact on aviation safety.
- (2) The findings revealed some risks associated to RA functionality for all types of aircraft posed by 5G infrastructure such as cellular antennas, including those near Canadian airports or aerodromes which may interfere with aircraft RA.
- (3) TCCA and Innovation, Science and Economic Development (ISED) have taken several steps to mitigate immediate risk. TCCA has published Civil Aviation Safety Alert (CASA) No. 2021-08 - [Potential Risk of Interference of 5G Signals on Radio Altimeter](#) for operators and ISED published Standard Radio System Plan (SRSP) 520, Issue 03 - [Technical Requirements for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3900 MHz](#), which outlines provisions for airport protection and exclusion zones, along with other mitigations such as downward tilt of base station antennas to reduce risk of 5G interference.
- (4) RTCA Paper No. 274-20/PMC-2073 offers similar advisories as TCCA CASA 2021-08, where it advises of potential 5G interference from PEDs such as tablets and cellular phones onboard aircraft. Air operators should work collaboratively with the manufacturers of the aircraft and of the radio altimeters in their fleet, as well as PED manufacturers, to evaluate the risks posed by the 5G environment during air operations, to develop and implement procedures and/or operation restrictions as required, to protect their aircraft from potential interference of 5G signals on the radio altimeter models used in their fleet.

7.0 Crew member training

- (1) Initial and recurrent crew member training on the company's policy and procedures for the use of transmitting and non-transmitting PEDs should include, without being limited to, the following:
 - (a) Initial training
 - (i) the company policy and how to interpret it;
 - (ii) awareness of the potential impact on aircraft systems from improper use of PEDs;
 - (iii) the various types/classes of technologies that may be encountered, and how to correlate these to the company PED policy; and
 - (iv) within each technology class, examples of the various device types available and typical logos identifying certain standards (e.g., 'CE', 'CSA' 'UL') or operating modes (e.g., airplane, Wi-Fi).
 - (b) Recurrent training
 - (i) latest version of the operator's PED policy and details of any revisions;
 - (ii) review of recent occurrences related to the use of PEDs, if applicable; and
 - (iii) recent developments in PED technology that crew members may encounter on board.

8.0 Information management

- (1) Not applicable.

9.0 Document history

- (1) Advisory Circular (AC) 700-005 Issue 03, RDIMS 8928734 (E), 9179449 (F), 2014-04-15 — Use of Transmitting and Non-Transmitting Portable Electronic Devices
- (2) Advisory Circular (AC) 700-005 Issue 02, RDIMS 6623530 (E), 6735086 (F), 2011-07-06 — Use of Transmitting Portable Electronic Devices
- (3) Advisory Circular (AC) 700-005 Issue 01, RDIMS 2239505 (E), 3689337 (F) 2008-04-28 — Use of Transmitting Portable Electronic Devices
- (4) 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.
- (5) Air Carrier Advisory Circular (ACAC) 0106, 1996-11-15 — Use of Portable Passenger-operated Electronic Devices Onboard Aircraft
- (6) ACAC 0048, 1993-03-25 — Use of Portable Passenger-operated Electronic Devices Aboard Aircraft

10.0 Contact us

For more information, please contact:

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We invite suggestions for amendment to this document. Submit your comments to:

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Appendix A – Validation references and guidance

1.0 Overview

- (1) The matrix below provides specific guidance references and their description. They may be used as a means to validate PED usage.

Item no.	Guidance	Information
1	RTCA/DO-307	RTCA/DO-307 provides demonstration methods for tolerance to intentional PED transmission and tolerance to spurious transmissions from PEDs.
2	RTCA/DO-160	RTCA/DO-160 provides testing parameters and requirements for ensuring PEDs meets RF radiated emissions limits. Testing also includes peripheral devices (external sensors, cables, wiring) used with PEDs during normal operations. Typically, peripherals are external sensors or associated wiring.
3	RTCA/DO-363	RTCA/DO-363 addresses the spectrum expansion of the 5G technology and the introduction of PED transmitting in the frequency spectrum above 5.9 GHz. It provides guidance to air operators, aircraft, and original equipment manufacturers in establishing an aircraft as PED tolerant. Guidance, including a safety risk assessment process, is provided to assist users in ensuring sustained PED tolerance throughout the aircraft's lifecycle.
4	RTCA/DO- 294	RTCA/DO-294 provides guidance, including a safety risk assessment process to assist users in ensuring sustained PED tolerance throughout the aircraft's lifecycle. Note: The latest version of this document was released in December 2008 and addressed near-term transmitted PED technologies on network technologies on such as CDMA, TDMA/GSM, etc. Consideration should be given to more recent and relevant technologies.
5	InFOs 13010 and 13010SUP	Provide methods for air operators to determine if they can safely expand PED use throughout various phases of flight.