

Revision 1

5 April 2025

Operation of Portable Electronic Devices (PEDs) During Flight Under IFR

General

Civil Aviation Authority (CAA) Advisory Circulars (ACs) contain information about standards, practices, and procedures that the Director has found to be an **acceptable means of compliance** with the associated rule.

Consideration will be given to other methods of compliance that are presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate AC.

Purpose

This AC describes an acceptable means of compliance with the requirements for the operation of portable electronic devices (PEDs) during flight under IFR.

Related Rules

This AC relates to Civil Aviation Rule Part 91.7, *Portable electronic devices*.

Change Notice

Revision 1 is a substantial rewrite, to include guidance material around passenger understanding of PEDs and to clarify the operator's responsibilities. It also updates rule references, makes formatting and stylistic changes, and adds a Version History.

Cancellation Notice

This Revision cancels the Initial issue of this AC, dated 1 April 1997.

Version History

History Log

Revision No.	Effective Date	Summary of Changes
AC91-5, Rev 0	1 April 1997	Initial issue of this AC
AC91-5, Rev 1	5 April 2025	A substantial rewrite, to include guidance around how to ensure passenger understanding of PEDs and clarify the operator's responsibilities. Also updates rule references, makes formatting and stylistic changes, and adds a Version History.

Table of Contents

1	Introduction	4
2	Abbreviations	4
3	Rule purpose	5
4	Guidance on the use of PEDs – Operators’ obligations	5
	• Documenting PED procedures and rules.....	6
	• Training programmes.....	6
5	Briefings to passengers	6
	• Designing briefing materials	6
	• What to include in passenger briefings	7
	• Common areas of confusion among passengers.....	7
	• Managing non-compliance.....	8
	• Risk of fire – instructions to passengers	8
	• Airside considerations in relation to PEDs	9
6	Testing Procedures	9
7	Stowage procedures.....	9
8	Recommended procedure for certifying PEDs for use on aircraft	9
	APPENDIX A – EMI test procedure for PEDs to be used on aircraft	
	(RTCA Document No. RTCA/DO-233, Appendix A)	11
1.0	Purpose.....	11
1.1	Test Rationale.....	11
1.2	Requirements.....	11
	• 1.2.1 General	11
	• 1.2.2 Measurement Tolerances	11
1.3	Bandwidth and Scan Time	11
	• 1.3.1 Measuring-Equipment Bandwidths	12
	• Table 1. Bandwidth and Measurement Time	12
1.4	Emission Identification	12
1.5	Frequency Scanning	12
1.6	Emission-Data Presentation.....	12
1.7	PED Operating Conditions	12
1.8	Purpose of Test.....	13
1.9	Test Configuration.....	13
1.10	Test Method	14
	APPENDIX B - Emission of Radio Frequency Energy: Maximum Levels	
	(Extract from RTCA DO-160C, Section 21)	15
	APPENDIX C – Use of PEDs in Aircraft	17
	• PED interference event.....	17
	• Transmitting portable electronic device (TPED).....	17

1 Introduction

PEDs are a significant part of people's lives and many people use them frequently for work or leisure.

Examples range from hand-held, lightweight electronic devices such as laptops, tablets, e-readers, and smart phones to small devices such as electronic games.

There are two main types of PEDs:

- ***Non-intentionally transmitting PEDs*** that do not intentionally transmit, but can give off a low-level transmission when turned on. Examples include cameras, e-readers, and i-pods.
- ***Transmitting PEDs*** intentionally transmit data, including any cellular communication, Bluetooth and wireless internet (Wi-Fi).

Both types pose a safety hazard to aircraft flying under instrument flight rules (IFR), as interference from these devices can affect the aircraft's avionic systems. There have been a number of reported incidents where interference from PEDs affected the aircraft's instruments.

Because many passengers don't understand the reasons for rules about acceptable PED use on aircraft, and why rules may differ between aircraft that seem like the same type, it is important to brief passengers thoroughly about acceptable use of PEDs in and around aircraft.

2 Abbreviations

CASA	Civil Aviation Safety Authority
EASA	European Aviation Safety Agency
EMI	electromagnetic interference
FAA	Federal Aviation Authority
NAA	National Aviation Authority
PED	portable electronic device
RTCA	Radio Technical Committee for Aeronautics
TCAD	Traffic alert and Collision Avoidance Device
TCAS	traffic alert and Collision Avoidance System
TPED	Transmitting portable electronic device ¹

¹A TPED can be defined as a PED that contains an intentional transmitter, where some or all of the radio frequency transmitting functions are turned on. Intentional transmitters may include devices enabled with cellular technology, wireless radio frequency network devices, and other wireless-enabled devices such as mobile telephones, tablets, laptop computers, and radio transmitters and receivers. Many TPEDs allow the user to disable the transmitting function (e.g. flight mode, flight safe mode). When disabled, the TPED becomes a non-transmitting device.

3 Rule purpose

The Radio Technical Committee for Aeronautics (RTCA) released a report in 1988 that made extensive recommendations for alleviating problems with interference from PEDs. The recommendations from this report provided the basis for the current requirements in rule 91.7.

CAA's assessment of CAA rules and advice on the use of PEDs in flight, summarised in, <https://www.aviation.govt.nz/assets/safety/reports/portable-electronic-devices.pdf>

concluded that, while the rule was fit for purpose, the AC needed to be revised to update advice on testing and operating procedures relating to PEDs.

The purpose of rule 91.7 is to clarify rules for using PEDs on flights using IFR, and alert the crew to possible interference from PEDs, which may result in the aircraft deviating from the intended flight path.

Rule 91.7 prohibits the operation of any mobile phone or other PED that is designed to transmit electromagnetic energy, on any aircraft while that aircraft is operating under IFR, except if the PED are:

- hearing aids
- heart pacemakers
- portable voice recorders
- electric shavers
- electronic watches, or
- any PED that the operator of the aircraft has determined can be operated without causing interference with any aircraft system or equipment in the aircraft on which it is operated.

4 Guidance on the use of PEDs – Operators' obligations

If you allow the use of PEDs onboard your aircraft, you should establish procedures to control and limit their use during IFR flight in accordance with rule 91.7(c). The procedures should establish at least:

- (a) the method(s) to brief passengers, as required under rule 91.211(a)(6) of:
 - (i) the restriction on the operation of any PED during take-off to initial top-of-climb and from final top-of-descent to landing, and
 - (ii) permissible times, conditions, and limitations when specific PEDs may be used, and
- (b) the procedures for inter-operation between flight crew, and for the co-ordination between the flight crew and the cabin crews for monitoring of possible PED interference, and
- (c) the procedure(s), in accordance with rule 91.5 to terminate the operation of a PED suspected of causing interference with an aircraft system, and

- (d) the procedure(s) for reporting instances of suspected and confirmed interference by a PED as required under Part 12, and
- (e) the procedure(s) for certifying the suitability of PEDs to be operated on-board the aircraft in accordance with rule 91.7(c)(6) (refer Section 8), and
- (f) the procedure(s) for verifying that PEDs used on-board the aircraft in accordance with rule 91.7(c)(6) have been certified as acceptable for use on-board the particular aircraft.

- **Documenting PED procedures and rules**

Information relating to PEDs should be included in the applicable sections of an organisation's exposition, such as:

- operations manuals
- training material
- internal checklists
- passenger safety information cards, and
- passenger briefing materials.

- **Training programmes**

These should include training on briefing passengers and also on what to do in case of:

- management of suspected or confirmed EMI
- smoke or fire from a PED or a battery and other similar scenarios, and/or
- passenger use of PEDs during emergencies.

5 Briefings to passengers

If your operation is going to allow the use of PEDs on your aircraft, you need to brief passengers on how to safely use these devices, limitations placed on their use and passengers' obligations.

- **Designing briefing materials**

Many NAAs have useful guidance that can form a basis for briefing materials. Good sources include:

- [this link](#) on the CAA website
- [this link](#) on the CASA website
- [these FAQs](#) on the EASA website
- [this mock interview](#) on the EASA website
- [FAA AC-91-21D](#) on the FAA website, and
- [Advisory Circular \(AC\) No. 700-005 \(canada.ca\)](#) on the Transport Canada website.

- **What to include in passenger briefings**

Some key points are:

- an airline operator must ensure that the type of aircraft they operate can tolerate the transmissions to PEDs, before allowing the use of PEDs
- the airline has the final say on what devices can be taken on board
- items larger than a laptop, or a laptop more than 1 kilogram, must be stowed away during take-off and landing to prevent injury caused by objects moving in flight
- operators need to give clear directions on the allowable use of PEDs onboard, including when they must be turned off and when they can be in flight mode, e.g. explaining that flight mode disables all transmitting functions, such as signals for mobile telephone, Bluetooth and Wi-Fi
- passengers must turn off PEDs when instructed by flight crew members
- passengers must put down devices to listen to the safety briefing, and remove head/earphones that are used in conjunction with that device
- some equipment during low visibility may not be safely compatible with PEDs so PEDs may need to be turned off during these periods.
- passengers are recommended to check the airline's policy before flying, as these can vary
- devices must be secured for take-off and landing, and
- while some NAAs are beginning to allow gate-to-gate usage of PEDs, this is not universal, so passengers should follow instructions about when they are allowed to use their PEDs.

- **Common areas of confusion among passengers**

There are some aspects of using PEDs on aircraft that frequently confuse passengers. It is recommended that you develop answers to common questions that relate to your operations, such as:

- When the passengers are told that transmitting functions cannot be used, they may not understand what a transmitting function is and what this means for them. For example:
 - are they turning on Flight Mode on their Kindles or e-book readers?
 - do they understand the difference between using their own data on their device to access the web vs. the aircraft's Wi-Fi?
- When there is Wi-Fi onboard an aircraft, passengers may not understand why they can't use their own PED not in flight mode, after the aircraft door closes until when the Wi-Fi becomes available.
- Some operators will have done the testing while others have not. Passengers, however, will not know if this has been completed for the aircraft they are on, so won't understand why rules differ between what seem like the same type of aircraft and or operator. For example, they may have come off one aircraft where they can use Bluetooth and get on another where they cannot.

- There are ports on some aircraft where passengers can plug in their devices to be charged but on other aircraft the ports can't be used to charge PEDs, which may not make sense to passengers.
- There is some confusion around standby mode and powering a device down. For example, clicking the button on a phone can turn the screen off but it is not completely turned off or 'shut down': it is just being put into a sleep mode. As a result, some passengers may not be putting their devices in flight mode, because they think they have turned them off.
- **Managing non-compliance**

Your operation also needs a plan for managing non-compliance, whether this is in error or deliberate:

- How will cabin crew check that all devices are turned off when they need to be?
- How best can cabin crew explain the safety implications of non-compliance to encourage reluctant passengers?
- How vigilant should cabin crew be in checking that passengers are listening to the safety briefings?
- Should you be encouraging passengers to report non-compliance by other passengers?
- What is the process for passengers who refuse to comply?
- **Risk of fire – instructions to passengers**

A PED interference event can be defined as unusual behaviour of on-board electronic systems and equipment that may be suspected as originating from PED use. This may also be referred to as an electromagnetic interference (EMI) event.

Nearly all PEDs contain lithium batteries, and these can catch fire during flight. It is important that cabin crew are aware of this risk and know what to do if a PED catches fire, that is, to:

- extinguish the fire with a fire extinguisher
- cool the PED with non-alcoholic liquid (water or other beverages), and
- store the PED submerged in water, away from cabin areas, to prevent the fire spreading.

It is recommended that in-flight briefings mention the possibility of PEDs catching fire and give clear instructions on what passengers should do if this happens, namely alerting cabin crew at the first sign of:

- smoke
- flames
- a strange smell
- the surface of the PED bulging
- the screen bulging or being discoloured
- the PED being hot to the touch, or

- anything else out of the ordinary.

It is also useful to remind passengers not to attempt to retrieve PEDs that have been trapped in crevices in seats or armrests, as these are vulnerable to fire. Instead they should ask cabin crew for help.

- **Airside considerations in relation to PEDs**

Passengers transiting to or from an aircraft can experience cognitive distraction from mobile phone or other PED use. This reduces situational awareness, increases unsafe behaviour and puts the passenger at greater risk of accidents.

Hazardous conditions include:

- other aircraft movements in close proximity and ground service or fuelling vehicles, and
- night operations at remote aerodromes without adequate airside lighting.

It is recommended that operational procedures do not permit the use of PEDs during this time. If the aircraft is being refuelled, passengers must not be permitted to use their device(s) on the tarmac and a staff member that has been appropriately trained should be present to ensure compliance.

6 Testing Procedures

Refer to Appendix A.

7 Stowage procedures

Like other bulky items, PEDs weighing more than 1 kilogram, such as laptops, must be stowed during the flight. They can be stowed in overhead lockers, or in other positions as directed by the crew. This helps to prevent injuries in the event of turbulence or an accident.

Small PEDs, that is, those smaller than a one-page safety card (or folded safety card), A4 or Quarto Size, must be stowed or secured at all times when seat belts are required to be worn. Otherwise, passengers should be encouraged to secure them on their person, e.g., in their pocket. Passengers may also secure small PEDs by placing them in seat pockets or holding them in their hands.

Since people have usually been allowed to hold books and reading material, similar rules have applied for hand-held devices as long as they are managed appropriately by the airlines/operator, and don't become a safety risk.

As a general principle, if a passenger is not holding the device in their hand, it needs to be stowed securely in an appropriate location, i.e. in a bag under the seat in front, seat back pocket, or in the overhead locker.

8 Recommended procedure for certifying PEDs for use on aircraft

4.1 RTCA Document No. RTCA/DO-233, Appendix A, details an acceptable EMI test procedure for PEDs used on-board aircraft. The procedure is reproduced at Appendix A to this AC.

4.2 PED emissions must be within the limits specified in RTCA Document No RTC/DO-160C, Section 21, Emission of Radio Frequency Energy. The relevant extracts from Section 21 have been reproduced at Appendix B. The three categories identified in Figures 21-6 and 21-7 are:

- (a) **Category Z** – Equipment intended primarily for operation in systems where interference-free operation is required.
- (b) **Category A** – Equipment intended primarily for operation in systems where interference-free operation is desirable.
- (c) **Category B** – Equipment intended primarily for operation in systems where interference should be controlled to a tolerable level.

4.3 You should ensure that PEDs used on your aircraft have been found acceptable in accordance with the Appendix A, or equivalent, procedure and meet the specifications of Appendix B. The test may be carried out by an organisation acceptable to you. Each PED should be approved by part or model number and serial number.

APPENDIX A – EMI test procedure for PEDs to be used on aircraft (RTCA Document No. RTCA/DO-233, Appendix A)

1.0 Purpose

The purpose of this specification is to measure the electromagnetic energy being radiated by a PED.

1.1 Test Rationale

This test method differs slightly from that specified in Section 21.4 of DO-160C due to the nature and size of PEDs and because they are not designed for permanent installation on aircraft. For these reasons, the table-top ground plane specified in Section 21 of DO-160C has been replaced with a non-conducting table. In addition, the height of the table has been reduced to 80 cm because the height is more representative of the height at which PEDs are used on aircraft (lap or seat-back table) and also because this height already is called up in International Electrotechnical Commission (IEC); International Special Committee on Radio Interference (CISPR²); and Federal Communications Commission (FCC). CISPR test-set configurations for information-technology equipment and digital devices.

Since PEDs are self-powered devices, methods for conducted-emissions testing have not been included in this document. However, it is anticipated that data-communications services will be available in the near future and, consequently, such lines and applicable simulators/terminators are to be included in the radiated-test set-up.

1.2 Requirements

- **1.2.1 General**

General requirements related to test methods, test facilities, and equipment are as stated below. Any exceptions or deviations from these general test requirements shall be documented in the test report.

- **1.2.2 Measurement Tolerances**

Unless otherwise stated for a particular measurement, the tolerances shall be as follows:

A.	Distance	$\pm 5 \%$
B.	Frequency	$\pm 2 \%$
C.	Amplitude, Measurement Receiver:	$\pm 2 \text{ dB}$
D.	Amplitude, Measurement System	
	(includes measurement receivers, transducers, cables, etc):	$\pm 3 \text{ dB}$

1.3 Bandwidth and Scan Time

All testing will be performed using the bandwidth and scan times listed below.

² Comité International Spécial des Perturbations Radioélectriques

- **1.3.1 Measuring-Equipment Bandwidths**

Measuring-equipment bandwidths must be chosen so that ambient levels are 6dB below emission limits. (These limits to be chosen based on the findings of the RTCA SC-177 In-Aircraft Test Group.)

Table 1 is a list of suggested bandwidths.

- **Table 1. Bandwidth and Measurement Time**

Frequency Range	6 dB Bandwidth	Dwell Time	Minimum Measurement Time
10 kHz - 250 kHz	1 kHz	0.015 sec	0.015 sec/kHz
250 kHz - 30 MHz	10 kHz	0.015 sec	1.50 sec/MHz
30 MHz - 1 GHz	100 kHz	0.015 sec	0.15 sec/MHz
Above 1 GHz	1 MHz	0.015 sec	15.00 sec/GHz

1.4 Emission Identification

All emissions, regardless of characteristics, shall be measured with the measurement receiver bandwidths specified above in Table 1-1. A peak detector shall be used and only narrow band emissions need to be recorded.

1.5 Frequency Scanning

For emission measurements, the entire frequency range for each applicable test shall be scanned. Minimum measurement time for analog-measurement receivers during emission testing shall be as specified in Table 1-1. Synthesised-measurement receivers shall step in one-half bandwidth increments or less and the measurement dwell-time shall be as specified in Table 1-1.

1.6 Emission-Data Presentation

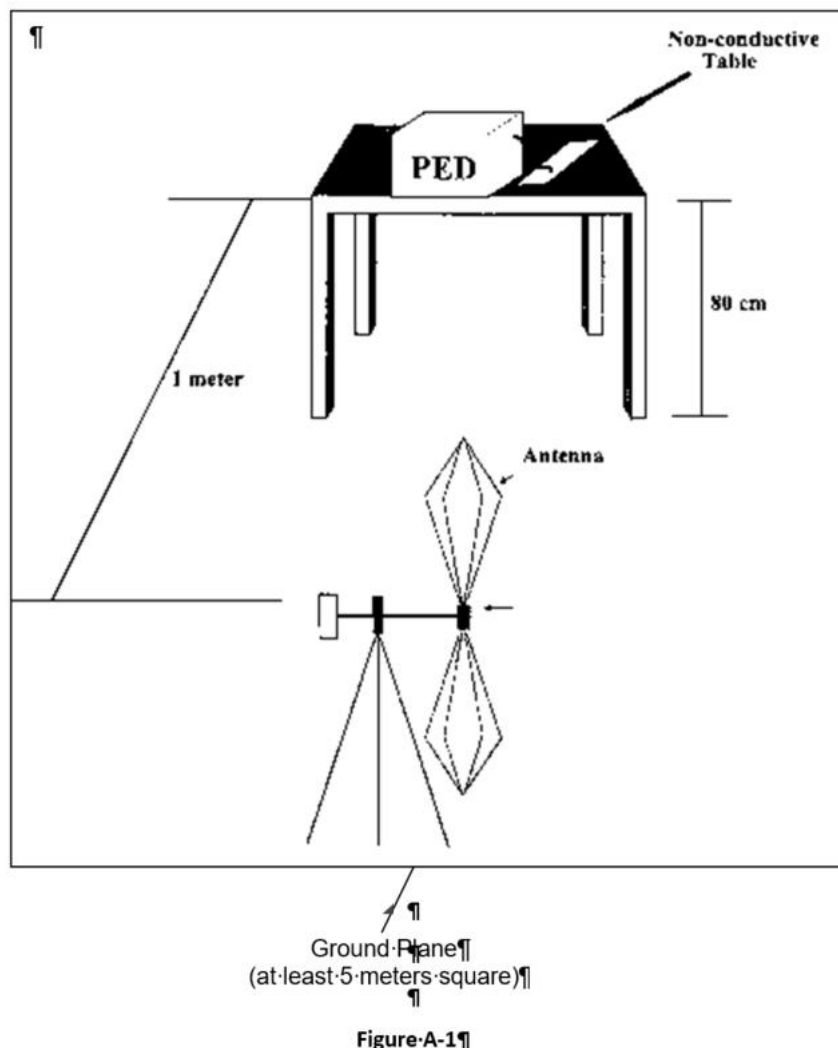
Amplitude versus frequency profiles of emission data shall be automatically and continuously plotted. The applicable limit shall be displayed on the plot. Manually gathered data is acceptable. The plotted data for emission measurement shall provide a minimum frequency resolution of 1.0% or twice the measurement-receiver bandwidth, whichever is less stringent, and minimum-amplitude resolution of 1.0 dB. The above resolution requirements shall be maintained in the reported results of the test report.

1.7 PED Operating Conditions

The PED shall be operated in the mode most representative of its uses as a carry-on item aboard aircraft. This mode shall be documented. This does not necessarily imply that all external ports must be active or connected, since PEDs often are designed to interface with a variety of peripheral devices that are not designed for use on aircraft. However, the PED shall not be operated in a standby mode.

The PED shall be powered by its own internal source to simulate actual user operation. AC power adapters shall not be included in the test set up since there are no connections which can be made to the aircraft at this time.

Typical PED accessories (e.g., headphones, mouse, supplementary battery packs) shall be connected during testing. The cables of such accessories shall be positioned so that they are on a line parallel with the face of the PED and 1.0 meter from the test antenna.



1.8 Purpose of Test

The purpose of this test is to measure the electric-field energy being generated by a PED.

1.9 Test Configuration

The equipment will be set up as shown in Figure A-1. Equipment shall be set up on a non-conducting table and operated in accordance with the normal operating procedure that is called out in the unit's user manual. The PED shall be oriented to produce the worst-case emissions. Any connections to the aircraft shall be simulated. The EMI receiver/analyser shall be tuned over the frequency range from 10 kHz to 6 GHz with the bandwidths as contained in paragraph 1.5 of this document.

Note: A shielded enclosure most likely will be required to meet ambient test requirements across the test-frequency range. However, an open-field test site or other site with reference ground plane is not excluded.

If a shielded enclosure is used, the PED, as well as all measurement antennas, must be positioned at least 1.0 m from any wall. (This does not include the spacing from the reference ground plane.)

The antenna shall be positioned such that its phase centre is 1.0m in front of the face of the PED under test. The axis of a directional antenna shall be at the same height as the centre of the PED under test.

1.10 Test Method

Narrowband radiated emissions only shall be measured across the frequency range from 10 kHz to 6 GHz, as described above.

All measurements shall be made using a peak detector.

From 10 kHz to 30 MHz a non-directional vertical rod antenna should be used. The rod antenna is positioned such that its centre corresponds to the height of the centre of the PED.

From 30 MHz to 6 GHz, directional antennas are used. Measurements shall be made using both horizontal and vertical polarisations and the higher of the two values shall be recorded.

If sweep-frequency measuring equipment is used, care must be taken to ensure that the sweep rate is slow enough to record the highest value of PED emissions at each frequency being measured.

APPENDIX B - Emission of Radio Frequency Energy: Maximum Levels (Extract from RTCA DO-160C, Section 21)

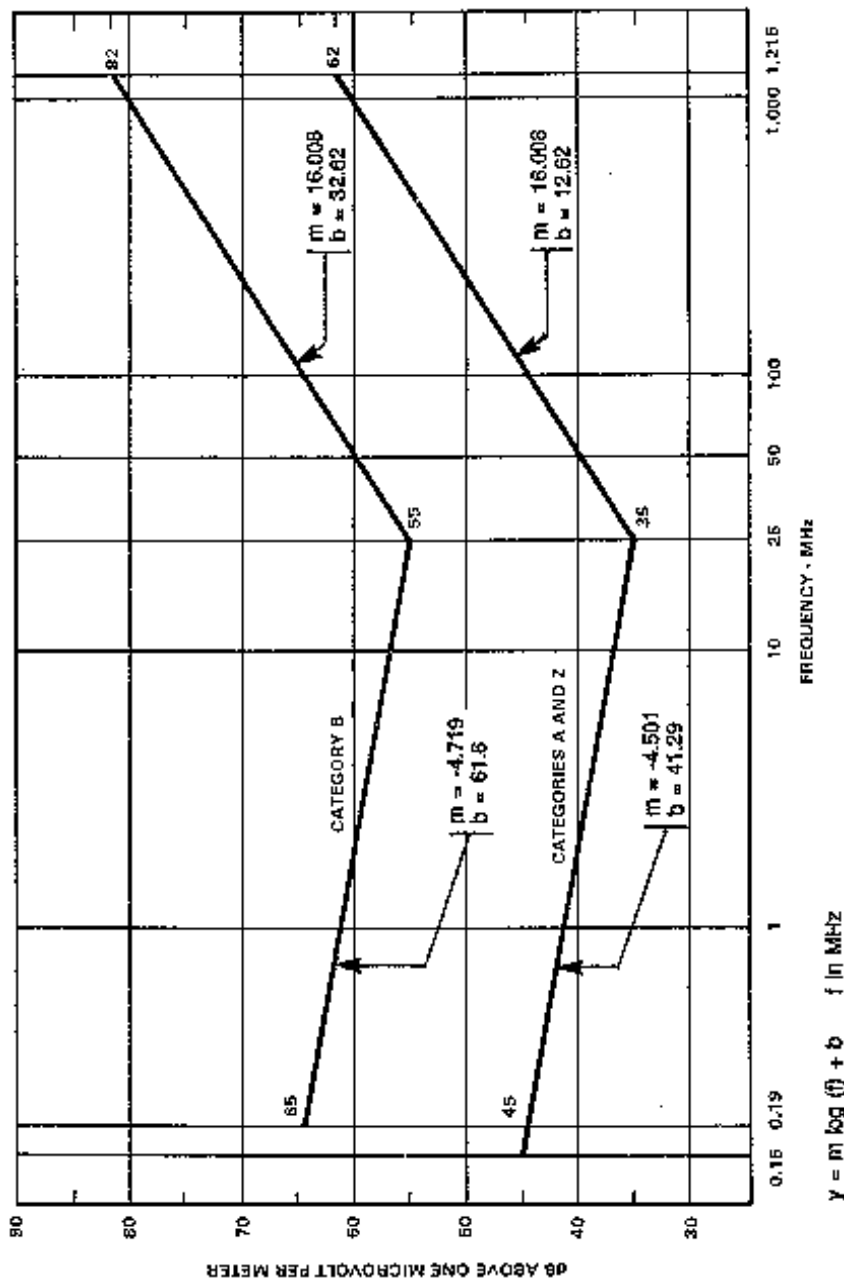


FIGURE 21-6 MAXIMUM LEVEL OF RADIATED CW INTERFERENCE FROM ANY ONE EQUIPMENT

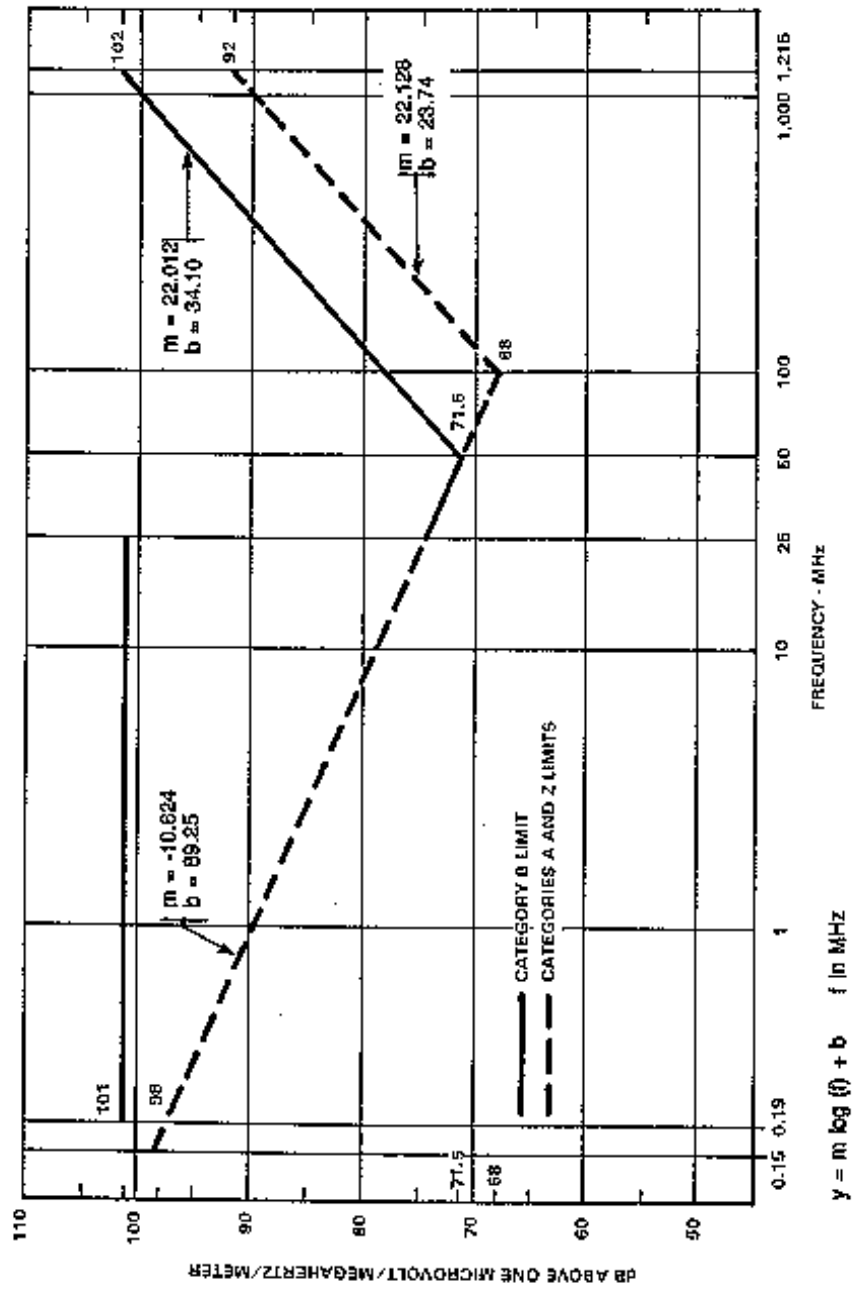


FIGURE 21-7

MAXIMUM LEVEL OF RADIATED BROADBAND AND PULSED CW FROM ANY ONE EQUIPMENT

APPENDIX C – Use of PEDs in Aircraft

1. The problems associated with the use of PEDs by passengers has been a growing concern for the airline industry for a number of years. PEDs are not designed to the same stringent standards as aircraft avionics systems. As a result, a number of devices transmit electronic signals, either intentionally or unintentionally. These transmitted signals can affect aircraft navigation, communication and flight control systems. Incidents reported in both New Zealand and overseas have included minor deviations in navigation instruments, difficulties in communication, disconnection of auto-pilot and auto-throttle systems, through to un-commanded inputs to the auto-pilot resulting in a sometimes rapid, unintentional climb and/or turn of the aircraft.

2. There is evidence to show that certain types of devices generate Electro-Magnetic Interference (EMI). Devices most likely to cause interference are intentional transmitters like cellular telephones and CB radios. These devices often transmit on a frequency that is similar to aircraft communication systems. There are other digital devices which are unintentional transmitters. These devices will radiate signals due to the use of a high-frequency clock oscillator; such devices include laptop computers, hand-held electronic games, video cameras and tape recorders. Other items like CDs and CD-ROM devices generate interference due to the voltage pulses which result as the laser sensors read information from the disc. Due to the way the laser sensor operates, the pulses are of an extremely short duration with the resultant effect that the switched power is of a short duration and can be in the order of watt or so for a brief instant. This is sufficient energy to affect aircraft systems.

- **PED interference event**

A PED interference event can be defined as unusual behaviour of on-board electronic systems and equipment that may be suspected as originating from PED use. This may also be referred to as an electromagnetic interference (EMI) event.

- **Transmitting portable electronic device (TPED)**

A TPED can be defined as a PED that contains an intentional transmitter, where some or all of the device's radio frequency transmitting functions are turned on. Intentional transmitters may include devices enabled with cellular technology, wireless radio frequency network devices, and other wireless-enabled devices such as mobile telephones, tablets, laptop computers, and radio transmitters and receivers. Many TPEDs allow the user to disable the transmitting function (e.g. flight mode, flight safe mode). When disabled, the TPED becomes a non-transmitting device.

3. The exact way that PEDs and the resulting EMI is able to affect aircraft systems has not been determined. There is sufficient evidence to confirm that they do, and this has resulted in extensive investigation to determine a solution. RTCA Special Committee 177 (a committee established in the United States to investigate the use of PEDs on-board aircraft) has been carrying out research since the 1960s on the interference created by PEDs. To date, the committee has not been able to conclusively determine the way that PEDs affect aircraft systems. Two possible methods are the coupling of the PED-EMI through either the aircraft wiring (which is routed under the floor and through the roof and sides of the aircraft cabin), or out through the cabin windows and received by the aircraft antennas. Until a quantified explanation for the interference is provided, the development of a solution is difficult. It is also highly probable that such a solution will only be able to be embodied on new-build aircraft.

4. CAA is required to provide the public with protection from the hazards associated with the use of PEDs on-board aircraft. Until a technical solution is achieved, this is being achieved

through regulatory restrictions. Hopefully, the regulations can be replaced by tighter aircraft and equipment technical standards in the future, allowing the use of PEDs through all phases of flight. The current Civil Aviation Rules prohibit the use of PEDs during the most critical phases of flight; the take-off and landing. During the cruise, PEDs are allowed if the aircraft is equipped with systems that provides a warning to the flight crew that the aircraft may have deviated from its intended flight path and there is the chance of a collision with another aircraft. If the aircraft is not equipped with such systems, then the airline may permit the use of a portable electronic device if the individual unit has been tested and certified as being acceptable for use on-board aircraft.

5. CAA has placed passenger and aircraft safety ahead of the need to use items like laptops, CD players and electronic games by introducing rules to cover what is a potentially hazardous situation. As more information is made available on the cause and solutions to interference by PEDs, the rules will be amended as required.