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USE OF PORTABLE ELECTRONIC DEVICES IN AIRCRAFT

1. Overview

- 1.1 The use of portable electronic devices (PEDs) on board aircraft by flight crew, cabin crew and passenger presents a source of uncontrolled electro-magnetic radiation with an attendant risk of adverse interference effects to aircraft systems.
- 1.2 PEDs can be considered as falling into two main categories, intentional and unintentional transmitters.
- (a) Intentionally transmitting PEDs (ie devices that intend to transmit) include :
- (i) Cellphones (cellular, portable or mobile phones), personal computer equipment with cellular network devices, two-way pagers, satellite phones and two-way radios;
 - (ii) Personal computer equipment with wireless local or personal area network (WLAN or WPAN) devices, radio transmitters and remote control equipment (which may include some toys).
- (b) Unintentionally transmitting PEDs include: personal computing equipment, radio receivers, audio and video reproducers, electronic games and toys, time measuring equipment and PEDs intended to assist flight crew and cabin crew in their duties.
- 1.3 It has been shown that the use of cellphones in flight may cause interference with aircraft systems, with possible adverse effects that could endanger the safety of the aircraft. The use of other PEDs may also cause interference with the aircraft's own systems.
- 1.4 It is the operator's responsibility to determine when any PED could be used on an aircraft and to enforce the current rules in accordance with any further guidance that may be given. This Circular contains additional information on PEDs and provides guidance for the operator.

2. Policy-Intentionally Transmitting PEDs

2.1 To control the use of intentionally transmitting PEDs, the operator should implement the following procedures :

- (a) Ensure that all intentionally transmitting PEDs are completely switched OFF once all of the aircraft doors are closed before the start of the flight. These devices should remain switched OFF until the moment that a passenger door is opened.
- (b) Operational procedures should include briefings and announcements to passengers during check-in to ensure that any intentionally transmitting PEDs placed in check-in baggage are completely switched OFF.
- (c) Announcements should be broadcast during the boarding process to provide passengers with sufficient opportunities to verify that all of their intentionally transmitting PEDs are switched OFF.
- (d) Further announcements should be broadcast after landing to ensure that all intentionally transmitting PEDs remain switched OFF until a passenger door has been opened.
- (e) Flight crew and cabin crew should observe the same restrictions for intentionally transmitting PEDs usage as passengers.
- (f) During fuelling operations, applicable restrictions concerning fire hazards will need to be observed relating to the operation of PEDs.
- (g) At the aircraft commander's discretion only, the use of intentionally transmitting PEDs **may** be permitted when the aircraft is stationary during prolonged departure delays provided that sufficient time is available to check the cabin before the flight proceeds. Similarly, after landing, the commander may authorise use of intentionally transmitting PEDs in the event of a prolonged delay for parking/gate position (even though the doors are closed and the engines are running).
- (h) The use of any intentionally transmitting PED should be prohibited except as permitted in the Annex to this Circular. In addition, the restriction does not apply to a PED where the sole means of transmission is verified as a low power, transmitting device that is fully compliant with the 'Bluetooth' standard and is clearly identifiable. Any use of such PEDs should be controlled in the same manner as for any unintentionally transmitting PED.
- (i) The cabin crew should be alert to any passenger use of intentionally transmitting PEDs, use of which in flight may endanger the aircraft.

3. Policy – Unintentionally Transmitting PEDs

3.1 To control the use of unintentionally transmitting PEDs, the operator should implement the following procedures :

- (a) **All** PEDs should be switched OFF, and fully disconnected from any in-seat electrical power supply and stowed for taxi, take-off, approach and landing, and during abnormal or emergency conditions.

Note 1 : This restriction applies to equipment carried on board by the passenger or provided to the passenger by the operator.

Note 2 : This restriction does not apply to time measuring equipment, implanted medical devices or permitted medical equipment.

- (b) Announcements should be broadcast to provide passengers with sufficient opportunities to verify that all of their PEDs are switched OFF.

3.2 The cabin crew should monitor use of PEDs during non-critical phases of flight and, where necessary, action should be taken to ensure that any suspect equipment is switched OFF.

4. Policy-General

4.1 Check in, security and ground handling staff as well as flight crew and cabin crew should be made aware of restrictions that are pertinent to their area of operations. These restrictions should be included within the procedures and conditions as specified in the Operations Manual and should be addressed in the associated flight crew and cabin crew training.

4.2 Any occurrences involving suspected or confirmed interference from any PEDs should be reported to the Director-General. Where possible, to assist follow up technical investigation, reports should describe the offending device, identify the brand name and model number, its location in the aircraft at the time of occurrence, interference symptoms, and the results of actions taken by the aircraft crew. The co-operation of the device owner should be sought by obtaining contact details.

5. Additional Information

5.1 Additional guidance and information on the use of PEDs in aircraft can be found in the Annex to this Circular.

6. AIC No. 13/2003 and 14/2003 are hereby superseded.

ANNEX

ADDITIONAL INFORMATION RELATING TO THE USE OF PORTABLE ELECTRONIC DEVICES IN AIRCRAFT

1. Introduction

- 1.1 Portable electronic devices (PEDs) are commonly used on board aircraft by flight crew, cabin crew and passengers, for various purposes. Such devices may present a source of electro-magnetic radiation with the risk of adverse interference effects to essential aircraft systems.
- 1.2 Given that a civil aircraft flying at high altitude and high speed and/or in busy airspace is in a potentially hazardous environment, and given that many of the on board systems are required safety operating devices intended to reduce the risks of that environment to tolerable levels, then anything that may degrade the effectiveness of those systems will increase the exposure of the aircraft to the hazards. Consequently, the aircraft operator should take measures that will reduce the risk of interference to acceptable limits.
- 1.3 PEDs fall into two main categories : those that transmit radio signals as a part of their functionality (intentional transmitters) and those that emit radio signals only as a by-product of their operation (unintentional transmitters).
- 1.4 In addition, an intentional transmitter may radiate ‘by-product’ interference in the same manner as an unintentional transmitter during its operation.

2. Intentionally Transmitting PEDs

- 2.1 The term ‘Intentionally Transmitting PEDs’ includes but is not limited to :
- Cellphones (cellular, portable or mobile phones);
 - Personal computer equipment with built-in or plug-in network devices capable of connecting to the cellular networks external to the aircraft or other ‘area’ networks within the aircraft (networkable Laptops, Portable Digital Assistants, etc);
 - Two-way pagers;
 - Satellite phones;
 - Two-way radios and other radio transmitters;
 - Remote control equipment (which may include some toys)

2.2 Intentionally Transmitting PEDs – Cellphone Type Devices

2.2.1 Portable Electronic Devices (PEDs) that are capable of intentional radiation are now common in everyday life throughout the world. Cellphones are recognised as capable of performing this action, but other devices that do not take on the appearance of a telephone have now joined these in general use. These other devices can take the form of two-way pagers and Personal Digital Assistants (PDAs) or Personal ‘Laptop’ or ‘Notebook’ computers with embedded or ‘plug-in’ network devices. These devices are available in a variety of sizes and even the smaller units contain a relatively powerful transmitter. These devices, which are capable of carrying voice or data signals to the nearest cellphone base station, pose a risk of interference equivalent to that of cellphones and their operation should be controlled in an identical manner.

2.2.2 The techniques adopted by the service providers of cellphone type devices and their associated networks were designed and engineered for use on the ground only. It has been shown that the use of cellphones in flight, including voice, data or text communication, may cause interference with aircraft systems, with possible adverse effects that could endanger the safety of the aircraft.

2.2.3 A cellphone will normally only transmit when it is in receipt of a base station signal. But if the cellphone is at maximum range from the base station, or when the received signal is attenuated, possibly by the aircraft structure, the cellphone reply may be transmitted at maximum power. In the majority of cases, the intentionally transmitting component of the cellphone cannot be inhibited unless the whole device is switched off.

2.2.4 However, a number of cellphones are now marketed as provided with an operating mode that permits the device to be used with the transmitter switched off. Examples are described as having a ‘flight’ or ‘plane safe’ mode. It is the operator’s responsibility to ensure that any use of such a device in the non-transmitting mode does not pose any interference risk and any use of such a device be controlled to ensure that the device is not transmitting. PDAs or Notebook computer devices that contain embedded or ‘plug-in’ network devices are capable of being operated with the transmitting element turned off. Any such operation of these devices when the transmitter has **not** been turned on should be controlled in the same manner as for any unintentionally transmitting device, use of which may be permitted during non-critical phases of flight.

Note: If the means by which it can be shown that such a device is in its transmitting or non-transmitting mode is not clearly evident and easily distinguishable by the flight crew or cabin crew, it remains the operator’s responsibility, and discharged through the aircraft crew, to ensure that the use of such a device is not permitted. Prior to permitting the use of such devices, an aircraft operator should give consideration to the following :

- (a) Ensure that use of any device with a ‘safe’ mode that operates as an

intentional transmitting PED when initially switched on, prior to being put into its 'safe' mode is prohibited.

- (b) Provision of clear instructions to flight crew and cabin crew to enable them to :
 - (i) Easily distinguish between accepted and non-permitted devices;
 - (ii) Determine that the devices are being operated in their 'safe' modes;
 - (iii) Determine that any displayed 'safe' mode was actually preventing transmissions of the actual device and was not continuing to transmit. Phone signal detectors, either portable or installed in the aircraft, have the potential to assist the cabin crew in detection of device transmissions or operation of non-permitted devices, and enable appropriate follow-up action.
- (c) Ensure the ability to continue to efficiently prevent the use of non-permitted devices.
- (d) Ensure that all devices with 'flight', 'plane safe' or equivalent modes are switched OFF when the announcements to switch OFF **all** devices are made.

2.2.5 In summary, the use of any cellphone type device in its transmit/receive mode is prohibited during the entire duration of the 'flight', from the moment that the aircraft doors are closed prior to commencement of the flight, until the moment that a passenger door has been opened after completion of the flight, except when expressly permitted by the aircraft's commander which may be granted in the event of a prolonged departure delay provided that sufficient time is available to check the cabin before the flight proceeds or in the event of a prolonged delay for parking/gate position.

2.3 **Intentionally Transmitting PEDs – Non-Cellphone Type Devices**

2.3.1 **Remote Control Equipment, Satellite Phones and Two-way Radios**

- (a) The use of any remote control equipment (which may include some toys), satellite phones, two-way radios and other radio transmitters should be prohibited during the entire duration of the 'flight' from the moment that the aircraft doors are closed prior to commencement of the flight, until the moment that a passenger door has been opened after completion of the flight.

2.3.2 **Wireless Local Area Network (WLAN) Devices**

- (a) Wireless Local Area Network (WLAN) devices are capable of independent communication between devices or within 'local area' networks. These devices are capable of communication between individual devices after the formation of a peer-to-peer ad-hoc network between users and may also be used to communicate within a WLAN system (complete with access points), if one is installed on the aircraft, through which the PEDs could connect.
- (b) The use of an installed WLAN network or WLAN devices within that or an ad-hoc network should not normally be permitted at any time. However, if the operator has verified that any use of a particular installed WLAN network or WLAN device within that network or within any subsequently emerging ad-hoc network is not a source of unacceptable interference or other safety hazard, the operation of the installed WLAN may be permitted during non-critical phase of flight. However, all installed equipment should be switched OFF and all WLAN PEDs switched OFF and stowed etc during critical phases of flight. In addition, cabin crew should monitor any passenger use of such PEDs during the flight and, where necessary, ensure that any equipment suspected of causing interference is switched off.

Note: Installation of such a WLAN network system will be subjected to modification action and approval of an appropriate Type Certificate or Supplementary Type Certificate modification. The modification should include an assessment of the likely WLAN PEDs that will interface with the network.

2.3.3 **Wireless Personal Area Network (WPAN) Devices**

- (a) Wireless Personal Area Network (WPAN) devices are normally only capable of independent communication between devices. One example of a WPAN system is 'Bluetooth', which uses very low power transmissions in the unregulated, non-aeronautical 2.4 – 2.5 GHz band. Bluetooth devices may be incorporated into PEDs brought on board by passengers and studies have been conducted that show that the interference risk in aircraft from these transmissions emanating from such equipped PEDs is sufficiently low to permit their use during non-critical phases of flight. However, cabin crew should monitor any passenger use of such PEDs during the flight and, where necessary, ensure that any equipment suspected of causing interference is switched off.

2.3.4 **Ultra Wideband Transmission Type Devices**

- a) Certain devices might, within the next few years, begin to appear with embedded Ultra Wideband transmission type devices. These devices are expected to emit very low power levels, but across a large part of the spectrum that may include other bands utilised by aeronautical services or for emergency transmissions. As a consequence of possible interference generated, the use of these devices should be prohibited.

3. Unintentionally Transmitting PEDs

3.1 The term 'Unintentional Transmitting PEDs' includes, but is not limited to :

- Personal computing equipment (Personal Notebook computers (Laptops), Personal Digital Assistants (PDAs), etc) without embedded or plug-in network devices, **or** devices with embedded or plug-in network devices when the network device is positively deactivated;
 - Electronic cameras, includes cine, video, still film and digital devices;
- Note:** This does not include camera functions embedded within cellphones, use of which should be prohibited during the flight.
- Radio receivers;
 - Audio, and video reproducers (tape, CD or other digital storage media players);
 - Electronic games and toys;
 - Implanted medical equipment, such as heart pacemakers;
 - Time measuring equipment, such as watches, stopwatches, etc;
 - Portable, non-transmitting devices intended to assist flight and cabin crews in their duties.

3.2 Portable Electronic Devices (PEDs) that do not emit intentional transmissions will radiate emissions from internal oscillators, processor clocks, motors including Compact Disc and CD-ROM drivers, large liquid crystal displays and power supply converters. The radio frequencies involved may fall in the bands used for aeronautical services, and emission levels may be sufficient to affect aircraft radio and navigation systems. Use of a PED on the flight-deck presents a particular risk to those systems having antenna equipment located in the radome or close to the windshield panels.

3.3 However, watches and calculators, etc which use small liquid crystal displays and other low power consumption equipment, such as heart pacemakers, have been shown to generate negligible interference.

3.4 In large transport category aircraft, the separation of passengers from sensitive aircraft equipment is usually sufficient to avoid interference, but in smaller aircraft, on flight-decks and where equipment is in use that produces exceptional levels of interference, some aircraft equipment may be affected. Flight crew are therefore advised to remain alert for such interference effects and ensure that when necessary, suspected equipment is turned off.

3.5 In summary, the use of unintentionally transmitting PEDs should only be permitted during non-critical phases of flight (such as during the cruise), and air operators should implement procedures to ensure that these devices are disconnected from any in-seat electrical power supply, switched off and stowed during taxi, take-off, approach and landing, and during abnormal or emergency conditions.

Note 1 : This restriction applies to equipment carried on board by the passenger or provided to the passenger by the operator.

Note 2 : This restriction does not apply to time measuring equipment, implanted medical devices or permitted medical equipment.

4. Flight Crew and Cabin Crew Use of PEDs

4.1 Devices that are provided to assist the flight crew and cabin crew in their duties should be used in compliance with the procedures and conditions stated in the Operations Manual of the aircraft operator.

4.2 Such equipment should be switched off and stowed during all phases of flight, unless the operator has performed tests that confirm that any use of these devices is not a source of unacceptable interference or distraction, and that the devices do not pose a loose-item risk or other hazard and the conditions for their use in flight are stated in the Operations Manual.

4.3 In summary, aircraft operators should alert their flight crews of the specific risks from, active cellphones on the flight-deck and introduce procedures to ensure that they are switched off. Flight crew and cabin crew should also avoid having cellphones switched on or using other transmitting devices during critical pre-flight procedures (eg. when loading route information into navigation systems or when monitoring fuel loading).

4.4 Otherwise, flight crew, cabin crew and other persons involved in dispatching the aircraft will need to observe the same restrictions as passengers.

4.5 This restriction does not preclude use of a cellphone by the flight crew to deal with an emergency although reliance should not be predicated on a cellphone for this purpose.

4.6 Similarly, the general aviation community should be alert to the interference risk from PEDs in small aircraft.