



AIRCRAFT ENGINEERING REPORT

AER07-2000-0105

Carriage of Portable Electronic Devices on UPS Aircraft

Revision Y

Revision Date: 4/04/2017

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RECORD OF REVISIONS

LTR	DATE	CHANGE
A	03/12/08	Revised the format of the conclusions section. Added Sensitech RF-Enabled Temp Tale monitor to the approved devices list. Added Sensitech Compliance Report to the attachments.
B	07/01/08	Added TurboTag series T-700 and T-700C temperature recording RFID monitors to the approved devices list. Added TurboTag FAA compliance document to the attachments. Added Omega OM-CP-PRT (Temp 101 and Temp 110) data loggers to the approved devices list. Added Omega description and MSDS documents to the attachments.
C	08/15/08	Added AmSafe Bridport RKN Unit Load Device (ULD), p/n CS10-02800(), to the approved devices list. Added associated documents to the attachments.
D	02/11/09	Added SkyCooler RKN-2006 Unit Load Device (ULD), p/n 735.001-000(-XX), to the approved devices list. Deleted attachments due to proprietary content.
E	09/09/09	Added Farrar model 7628 Unit Load Device (ULD) and Libero Ti1 and Ti1-S PDF data loggers to the approved devices list. Added RFID tags from Evigia, Hi-G-Tek, Identec, Orbit One, and Savi to the approved devices list.
F	05/10/10	Added IBM Lenovo T-400 TYPE 6474 "Think Pad" laptop computer to the approved devices list. This approval is limited to the MD-11 type aircraft only.
G	09/21/10	Added a new section for approved devices. This new sections will be used exclusively for transmitting (T-PED) devices. Revised introduction and analysis section with the addition of new information related to (T-PEDs). "Sentry" tracking tag added per AER10-2000-0018.
H	11/17/10	Added a new section (4) that outlines the reporting procedure to the FAA for any reports of suspected RF interference with an aircraft system.
J	5/09/11	Moved the 7628 temperature controlled cargo container from the PED section to the T-PED section of approvals. The new combined container and tracking device PharmaPort 360 Model 7628 are approved as a T-PED per AER11-2000-011.
K	10/26/11	<ul style="list-style-type: none"> - Revised Engineering Report to latest format. - Updated RTCA document revision levels. - Added the Moog/Crossbow ILC-1500 tracking tag to the list of approved T-PED devices per AER11-2000-0093.
L	10/14/13	<ul style="list-style-type: none"> - Revised Table of Contents - Deleted a duplicated distribution paragraph and updated list. - Revised paragraph numbering - Revised Introduction - Revised Distribution

		<ul style="list-style-type: none"> - Deleted References from Section 1 - Revised Section 2: General Statements - Deleted Section 3: Regulatory and Guidance Material - Added Section 3: Shipping Requirements - Deleted Section 4: Analysis: All engineering analysis will be contained in separate AERs listed in References at the end of this report. - Added PRHTemp 101A and 110, TT4 RF, HF01, UHF01, TIL-D, Tel-U, Til-L, Tel-N, and THi1 to the list of PEDs approved for carriage as evaluated by AER13-2000-0063-IR. - Updated descriptions of approved PEDs and added battery lithium content to table. - Added Moog/Crossbow ILC-2000 to approved list of T-PEDs as evaluated by AER11-2000-0093-A. - Deleted IBM laptop, Turbo Tag T700, Orbit 1 SX 1, EV3-ST, and Hi-G-Tek IG-ST-51-433 devices from the list of approved PEDs. - Revised Section 5: References
M	04/28/14	Added the OnAsset FlightSafe SENTRY 500 device to the approved list of TPEDs.
N	07/03/14	Added the American Thermal Instruments (ATI) Log-ic 360 family of devices to the approved list of PEDs.
P	1/30/15	Added the Sendum PT-300 and PT-300D devices to the approved list of T-PEDs.
Q	3/24/15	Added Comet data logger devices to the approved list of PEDs.
R	3/31/15	Superseded revision Q. Letter Q is not used in the revision sequence.
S	8/28/15	Added Queclink GL200 tracker to the list of approved T-PED devices per AER15-2000-00
T	10/29/15	Added AT&T Cargo View to Sentry 500 approval. Cargo View is the Sentry 500 TPED device marketed under the AT&T brand name.
U	3/16/16	Added 7P Solutions Inc GD100 tracking tag approval. The GD100 and previously approved GL200 are both distributed by 7P Solutions Inc.
V	9/06/16	Added Caterpillar PL161 Bluetooth Asset Tracking Device.
W	3/03/17	Revised the Distribution List. Added Verigo PA-2, PB-2, PD-2, and PE-2 data loggers.
X	-	NOT USED
Y	4/04/17	Deleted David Salzman from the distribution list. Revised listing for Verigo Bluetooth device to correct PD and PE listing. Added Controlant CO 10.01 Cargo Tracking Device.

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1. Introduction

1.1 Summary

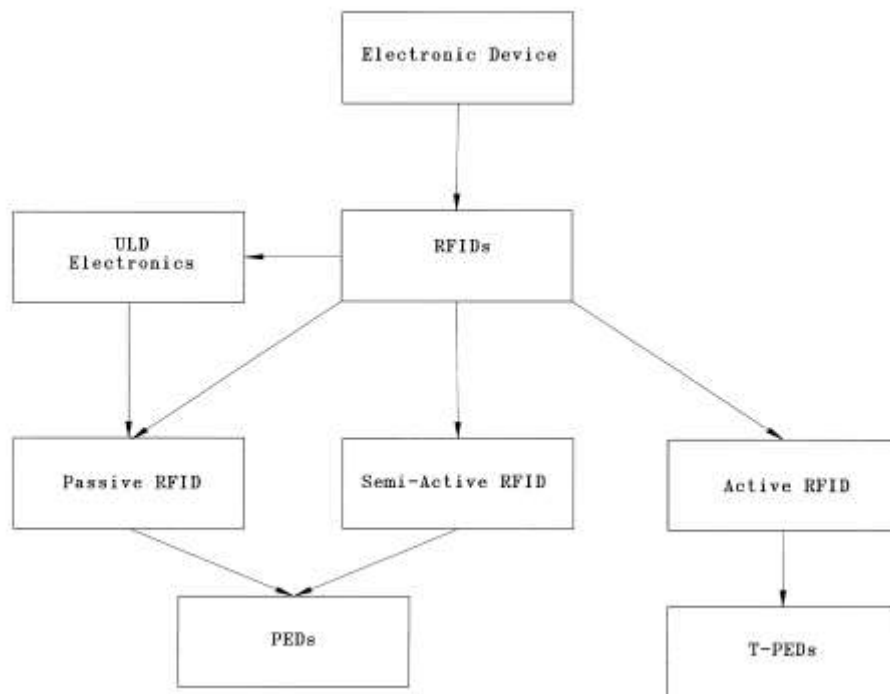
Federal Aviation Regulations (FARs) and the Code of Federal Regulations (Title 49) require that any item to be transported on an aircraft meet certain criteria to ensure safe transportation. This Aircraft Engineering Report (AER) provides a list of Portable Electronic Devices (PED) and Transmitting Portable Electronic Devices (T-PED) that have been reviewed and approved by UPS Aircraft Engineering for carriage on UPS aircraft. For the purpose of standardized terms, this report will use the terms PED and T-PED for the description of all these devices.

1.2 Purpose

This Engineering report provides the list of electronic tracking or data logging PED or T-PED devices and electronics included in environmentally controlled Unit Load Devices (ULDs) approved for carriage on UPS aircraft.

1.3 Scope

The scope of this Aircraft Engineering Report (AER) is limited to PEDs, T-PEDs, and environmentally controlled Unit Load Devices (ULDs) cargo containers. The devices listed in this report will be used for the purpose of recording or tracking the conditions that a particular package or group of packages is subjected to while being transported. These devices may have RF transmitting capability. Data may be extracted either directly from the device, by download to another device, or by direct transmission from the device to a service provider. An overview of this scope is shown in the following figure.



1.4 Acronyms

AC – Advisory Circular
AER – Aircraft Engineering Report
CFR – Code of Federal Regulation
DOT– Department of Transportation
FAR – Federal Aviation Regulations
PED – Portable Electronic Devices
RFID – Radio Frequency Identification
RTCA – Radio Technical Commission Aeronautics
T-PED – Transmitting Portable Electronic Devices
TSO – Technical Standard Orders
ULD – Unit Load Devices

2. General Statements

The transportation of electronic devices on commercial aircraft is regulated under Federal Aviation Regulations (FARs) 14 CFR 91.21 and 14 CFR 121.306. An FAA advisory circular, AC 20-162 has been issued to provide guidance to aircraft operators for the installation of RFID devices or systems on aviation products and equipment. RFID devices can also be considered PEDs. AC 20-162 also provides guidance for the use of RFID devices on baggage, mail containers, and cargo devices. The aircraft operator, in this case UPS, is tasked with reviewing and approving any electronic device for use on its aircraft to insure that the device will not interfere with aircraft communications or navigation systems.

Devices that have active cellular or WiFi transmitters may be approved by following additional guidance in RTCA document DO-294C. These devices are classified as T-PEDs. T-PED devices must not be actively transmitting while the aircraft is in operation or must be shown by analysis and/or testing to not produce any interference with aircraft systems.

Electronic devices that UPS may carry in or attached to cargo or packages are generally intended to record or monitor the conditions under which the package or cargo is being transported. This recording or data logging is for the purpose of damage claim verification for shipments that are of high value, perishable, or regulated products.

Unit load devices (ULDs), cargo containers, which can independently control their internal environmental conditions are also included in this report. The electronics contained in these ULDs are similar to PEDs. The primary purpose is to control and log the internal environmental data of the ULD. The ULDs are not powered by lithium batteries, but instead are powered by batteries approved for transportation on cargo aircraft. The electronics of these ULDs have properties of a PED device and must comply with the regulations for transport. The ULDs themselves are not within the scope of this review and are approved by the TSO process to be used as cargo containers. All of the devices listed in this report (PEDs, ULDs, and T-PEDs) have been reviewed by UPS Aircraft Engineering to ensure they are compliant to the requirement of 14 CFR 91.21 and 14 CFR121.306 and to 49 CFR 173.21 and 49 CFR 173.185.

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3. Shipping Requirements

3.1 49 CFR 173

The shipper must follow the guidance provided by UPS for the packaging and shipping of electronic devices that contain Lithium batteries. Some of the devices listed in this report contain a Lithium battery. The Table in section 4 lists the Lithium content of the battery for each approved device.

3.2 Lithium Battery Limitations

For the purpose of calculating the Lithium content of a primary (non-rechargeable) battery the following equation is used. (Provided by the DOT in guidance for shipping batteries by air)

$$(mAh / 1,000) \times 0.3 = \text{grams of Lithium}$$

For the purpose of calculating the energy content of a Lithium Ion (rechargeable) battery the following equation is used. (Provided by the DOT in guidance for shipping batteries by air)

$$Wh = (mAh \div 1,000) \times \text{Volts}$$

4. Approved Devices

4.1 PEDs

Manufacturer	PEDs	Lithium Content of non-rechargeable Battery
TempTrip	HF01 UHF01	90mAh = 0.027 gram 165mAh = 0.050 gram
Libero	Ti1 Ti1-S Ti1-D Ti1-L Te1-U Te1-N Te1-P THi1	From OEM document, less than 1 gram
Sensitech	TempTale4, TT4 TempTale4, TT4 (RF)	220 mAh = 0.062 gram 1450 mAh = 0.44 gram
Madge Tech	PRHTemp101 Temp101A PRHTemp110	750 mAh = 0.225 gram
Omega	OM-PC-PRTemp 101 OM-PC-PRTemp 110	From MSDS data sheet = 0.12 gram From MSDS data sheet = 0.20 gram

Savi	ST-614-031 ST-616-031 ST-618-032 ST-621-032 ST-654-031 ST-673-030 ST-674-030	3600 mAh = 1.08 gram
Identec	iQ310-SET iQ310-ATN iQ310-ATR iQ310-DRT iQ310-LPT	iQ310-ATN 2200 mAh = 0.66 gram iQ310-(SET, ATR, DRT, LPT) 3650mAh = 1.095 gram
AmSafe	RKN ULD P/N CS10-02800()	NONE
SkyCooler	RKN-2006 ULD P/N 735.001-000-(XX)	NONE
Evigia	EV-3-AT EV-3-ATNRB EV-3-DRT EV-3-LPT	3600mAh = 1.08 gram
American Thermal Instruments	L- 3100, L-3110, L-3130, L- 3133, L-3200, L-3210, L- 3230, L-3300, L-3310, L- 3330, L-8100, L-8110, L-8130, L- 8133, L-8200, L- 8210, L-8230, L-8300, L- 8310, L-8330	220mAh = 0.066 gram
Comet NOTE: The wireless GSM modem (LP040) accessory is not included in this approval.	S0110, S0110E, S0111, S0121, S0122, S0141, S0541, S0841, S0842, R0110, R0110E	2200mAh = 0.66 gram

4.2 T-PEDs

Manufacturer	T-PEDs	Energy content of rechargeable battery
OnAsset	SENTRY 40 SENTRY 500 AT&T Cargo View	14 watt hours 38 watt hours (extended life) 38 watt hours (extended life)
Cool Containers	PharmaPort 360 Model 7628	NONE
Moog/Crossbow	ILC-1500 ILC-2000	6.66 watt hours
Sendum	PT-300 PT-300D	14.3 watt hours
Quealink	GL200	4.81 watt hours
7P Solutions	GD100	3 X 0.38 = 1.14 grams (non-rechargeable)
Caterpillar	PL161	0.18 gram (non-rechargeable)
Verigo	PA2, PB2, PD0, PE0	0.155 gram (non-rechargeable)
Controlant	CO 10.01	6.7 watt hours

5. References

- a) FAA Advisory Circular AC 20-162, September 22, 2008
- b) RTCA DO-294C, December 16, 2008
- c) UPS Aircraft Engineering Report AER10-2000-0018 (OnAsset SENTRY 400 evaluation)
- d) UPS Aircraft Engineering Report AER11-2000-0011 (PharmaPort 360 modem evaluation)
- e) UPS Aircraft Engineering Report AER11-2000-0093 (Moog ILC 1500 and ILC 2000 evaluation)
- f) UPS Aircraft Engineering Report AER13-2000-0063 (PED evaluations)
- g) UPS Aircraft Engineering Report AER14-2000-0009 (OnAsset SENTRY 500 evaluation)
- h) UPS Aircraft Engineering Report AER14-2000-0080 (Sendum PT300 / PT300D evaluation)
- i) UPS Aircraft Engineering Report AER15-2000-0061 (Quealink GL200 and 7P GD100)
- j) UPS Aircraft Engineering Report AER16-2000-0052 (Caterpillar PL161)
- k) UPS Aircraft Engineering Report AER17-2000-0010 (Verigo PA2, PB2, PD0, and PE0 data loggers)
- l) UPS Aircraft Engineering Report AER17-2000-0025 (Controlant CO 10.01 Cargo Tracking Device)