BSI Standards Publication

Aerospace series — Contact Memory Button (CMB) tags intended for aircraft use

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National foreword

This British Standard is the UK implementation of EN 4819:2012.

The UK participation in its preparation was entrusted to Technical Committee ACE/1, International and European Aerospace Policy and Processes.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4819

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English Version

Aerospace series - Contact Memory Button (CMB) tags intended for aircraft use

Série aérospatiale - Bouton Mémoire par Contact (CMB) pour usage aéronautique

Luft- und Raumfahrt - Kontakt-Speicherknopf (CMB) für Luftfahrtverwendung

This European Standard was approved by CEN on 25 February 2012.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 4819:2012) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2012, and conflicting national standards shall be withdrawn at the latest by November 2012.

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1   Scope

The scope of this European Standard is to:

- Provide a requirements document for CMB Manufacturers to produce systems for the Aerospace and Defence industry.

- Identify the minimum performance requirements specific to CMB used on Aerospace and Defence vehicle parts accessed only during ground operations.

- Identify existing standards applicable to CMB.

- Provide a qualification standard for CMB which will use permanently-affixed installation on systems.

- Provide some patterns of data.

In addition to any relevant document from certification authorities, the following documents should be taken into account to define requirements concerning the technical specifications for CMB:

- EUROCAE documents: ED-14, Environmental Conditions and Test Procedures for Airborne Equipment.

- RTCA documents: DO-160, Environmental Conditions and Test Procedures for Airborne Equipment.

- Military Standard: MIL-STD-810, Department of Defense Test Method Standard for Environmental Engineering Considerations and Laboratory Tests.

2   Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ED-14, *Environmental Conditions and Test Procedures for Airborne Equipment* [1]

DO-160, *Environmental Conditions and Test Procedures for Airborne Equipment* [2]

MIL-STD-810, *Department of Defense Test Method Standard for Environmental Engineering Considerations and Laboratory Tests* [3]

3   Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
AEROSPACE APPLICATIONS
used on products created for the aerospace industry

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[1]   Published by: EUROCAE Regional (EU) EURopean Organisation for Civil Aviation Equipment http://www.eurocae.org/.

[2]   Published by: Radio Technical Commission for Aeronautics http://www.rtca.com/.

[3]   Published by: DoD National (US) Mil. Department of Defense http://www.defenselink.mil/.

3.2

AIRBORNE USE

used on aircraft while in flight—as opposed to Ground Service Equipment, which is used on aircraft, but only while, the aircraft is on the ground

3.3

AIR TRANSPORT ASSOCIATION

Airline trade association whose purpose is to foster a business and regulatory environment that ensures safe and secure air transportation. ATA coordinates standards-creation in support of this purpose

3.4

CONTACT MEMORY BUTTON

Battery-Free Read/Write Electronic Storage Device which Data is retrieved and updated with Momentary Contact using a Button Link

3.5

EASA

European Aviation Safety Agency

3.6

EUROCAE

European Organisation for Civil Aviation Equipment

3.7

FAA

Federal Aviation Administration — the airworthiness and aviation authority in the United States of America

3.8

HUMAN-READABLE

Human-readable refers to a representation of information that can be naturally read by humans. In most contexts, the alternative representation is data primarily designed for reading by a machine, e.g., scanner/computer/etc.

3.9

BUTTON LINK

system used to read or write information from / to the CMB and power supply it

3.10

ISO INTERNATIONAL STANDARDISATION ORGANISATION

an international association that manages the process of setting global standards for communications and information exchange

3.11

MACHINE-READABLE

the term machine-readable (or computer-readable) refers to information encoded in a form which can be read (i.e., scanned/sensed) by a machine/computer and interpreted by the machine's hardware and/or software. Machine-readable technologies include optical character recognition (OCR) and barcodes

3.12

INERT DEVICE

device with no emission of electromagnetic waves and no battery

3.13

RTCA RADIO TECHNICAL COMMISSION FOR AERONAUTICS

RTCA, Inc. is a private, not-for-profit corporation that develops consensus-based recommendations regarding communications, navigation, surveillance, and air traffic management (CNS/ATM) system issues. RTCA functions as a Federal Advisory Committee

3.14
SCD SPECIFICATION CONTROL DOCUMENT
a requirements document used in lieu of, or in addition to, engineering drawings, and which specifies required performance, physical envelope, and interfaces with adjacent equipment and systems

3.15
SECURITY
some minimum level of encoding or password-protecting a data source in order to prevent tampering or inadvertent loss

4   General requirements

This standard establishes the documentation required for the development of Contact Memory Button.

This standard does not cover:

- Button link.

This standard's requirements will concern CMB that:

- Are approved for attachment to aircraft ("airborne use"), (regulations limit operation to read/write only while on the ground),
- Can be integrated into labels and tags with machine-readable and human-readable data (print and barcode),
- Are used for new airplane certification as well as retrofitting on previously-certified aircraft or systems,
- Use digital data for supplemental part marking and tracking.

This standard can also be used for "weapon systems".

5   General configuration

CMB consists of a button.

Contact Memory Button is a battery-free, read/write electronic data storage device.

It can be used in environments including military, aerospace, utility, transportation and industrial applications.

Contact Memory Button enhances among others, applications such as configuration management, asset tracking, inspection and maintenance for the life of the asset it is attached to.

Data stored on the Contact Memory Button, which could be available in various memory capacities, is retrieved and updated with momentary contact using a button link.

Contact Memory Button should have the ability to be used with security system policies.

For the definition of the requirements concerning security, refer to common criteria. These criteria consider both intrinsic performance of the solution and the performance of their use in order to facilitate the choice of a solution adapted to their needs.

Contact Memory Button shall be permanently affixed to parts using approved mechanical or adhesive methods, processes and products. Contact Memory Button will have the possibility to be embedded into parts.

6   Applicability

This document establishes the documentation required for the development of CMB used for but not limited for:

- Aeronautics,
- Defence,
- Space,
- Industrial activities (products processes and services).

These Integrated Technology devices can be used but not limited for:

- Configuration management
    - o Identification of the components.
- In service follow-up
    - o Integration of technical data embedded in the datasheet regarding installation, use and maintenance of the equipment on which the CMB is installed.
- Asset tracking traceability industrial/supply chain,
- Inspection and maintenance activities,
- Calibration Data Management.

7   Requirements

- In order not to trigger a re-assessment of the airworthiness certification of the systems or other kind of systems or certifications, the buyer will ensure that the fact to add CMB components is a minor change according to the dedicated referential.

The following criteria are considered as particularly important:

- Weight
    - o The weight of the CMB compared to the weight of the system has to be under a level that ensures that the installation of the CMB is a minor evolution against FAA or EASA referential.
- Dimensions
    - o The dimensions depend on the concerned system, the location of its installation and its environment.
- Affix – Integration
    - o The CMB should have the possibility to be affixed by:
        - ▪ mechanical means (bolt, rivet, …),
        - ▪ bonding or gluing,
        - ▪ integrating.
    - o There should be a process to define the installation of the CMB on the part. The CMB shall consider the safety aspects of the system.

- Life limit

    o The life limit of the CMB has to be the same as the life limit of the part.

    o The data has to be stable for at least 20 years, or more, depending on the concerned part.

    o There must be a procedure for refreshing the data for a new cycle as required in ATA SPEC 2000 Chapter 9-5.

    o There must be a procedure for the replacement of the CMB as required in ATA SPEC 2000 Chapter 9-5.

- Temperature

    o The following temperature values shall be taken into consideration; whenever they conflict with the individual system specification, the latter shall govern.

        ▪ Operating Temperature: from – 55 °C to 125 °C,

        ▪ Storage Temperature: from – 65 °C to 150 °C.

- Environmental

    o Environmental specifications shall satisfy the testing requirements of EUROCAE ED-14 or RTCA DO-160, for Civil or MIL-STD-810 for Civil or Military applications, or STANAG as follows:

        ▪ Low Pressure (Altitude),

        ▪ High temperature,

        ▪ Low Temperature,

        ▪ Temperature Shock,

        ▪ Fluid Susceptibility,

        ▪ Rain,

        ▪ Humidity,

        ▪ Salt Fog/Spray,

        ▪ Sand and Dust,

        ▪ Immersion,

        ▪ Acceleration,

        ▪ Shock,

        ▪ Acidic Atmosphere,

        ▪ Icing/Freezing Rain,

        ▪ Vibration,

        ▪ ESD.

    o Additional requirements.

    Nevertheless, CMB shall at least comply with the following requirements:

        ▪ Pressure : from 50 hPa to 2 000 hPa,

        ▪ Vibration: 10 G RMS,

        ▪ Impact: saw tooth 20 g-Pk – 11 ms – all directions,

        ▪ Sustained acceleration: ± 10 g-Pk – all directions,

        ▪ EMI: no loss of stored data when exposed to RF signals of 200 V/m,

        ▪ EMP: no loss of stored data when exposed to 5.8 kV/m, 26.7 kV/m and 55.0 kV/m,

        ▪ Magnetic Field: no loss of stored data when exposed to 8,000 gauss magnetic flux density field,

        ▪ Gamma Radiation: no loss of stored data when exposed to 75.0 Krads of 60 Co gamma radiation.

NOTE   If acoustic noise is considered as a major technical specification, MIL-STD-810, Method 115, or equivalent, should be used for testing requirements.

- Data
    - Storage Capacity in the CMB: adapted to the needs of the purchaser,
    - Integrity,
        - If the transfer is interrupted, the data stored in the CMB must not be altered.
    - Any kind of data should be supported by the memory (file extensions such as .doc, .pdf, .JPEG, …),
    - Firmware updates should be available.

- Hardware and bus definition
    - In order to standardize the Contact Memory Button the manufacturer shall provide:
        - Outline drawings with key dimensions,
        - Pin out assignment (i.e. power supply, clock, data, ground, …),
        - Electrical characteristics with associated tolerances (i.e. current, voltages, rise time, fall time, duration, clock frequency, hold time, set-up time, …) at Tmin, Tamb, Tmax. Max line capacitance etc.,
        - Name of standard bus (i.e. I²C, USB, …) (*) or if not communication protocol.

- Data
    - File management and the structure of the data exchanged shall be open including ATA SPEC 2000 Chapter 9-5 and Annex 11.

- Button Link
    - Electrical information shall be open.

- Security
    - Cryptology.
        - It should be possible to store encrypted data on CMB.
    - Protocol.
        - Different kind of security protocols can be used.
    - Unique Identification number.
        - The different component, CMB, button link shall have a unique identifier, accessible for encrypting systems (identification, encryption, …).

- Demounting activities
    - There should be a process defined for demounting activities of the CMB from the part.

- Civilian activities
    - Resistance to chemical products shall respect EUROCAE ED-14 or RTCA DO-160 latest edition, or MIL-STD-810F Environmental Specifications for test or equivalent in STANAG and or whatever relevant for certification authorities.

- Military activities: Exportation Restrictions
    - ITAR: The CMB must be non ITAR covered,
    - EAR: The CMB must be non EAR covered,
    - Dual Use: The CMB should not be considered as military technology.

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*   In this case, there is no need to provide electrical characteristics.

Bibliography

[1]   ATA SPEC 2000, *E-Business Specification for Materials Management — (see Chapter 9.5 – Annex 11)*

[2]   ISO 9001, *Quality Management Systems — Requirements*

[3]   EN 9100, *Quality Management Systems — Requirements for Aviation, Space and Defense Organizations*

[4]   AS 9100, *Quality Management Systems — Requirements for Aviation, Space and Defense Organizations*

[5]   MIL-STD-202, Method 112E*, Test Method Standard, Electronic and Electrical Component Parts*

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