

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: AIRBORNE LOW-RANGE RADIO ALTIMETER

1 – Applicability

This ETSO gives the requirements which Airborne Low-range Radio Altimeter that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

2 – Procedures

2.1 – General

Applicable procedures are detailed in CS-ETSO, Subpart A.

2.2 – Specific

None.

3 – Technical conditions

3.1 – Basic

3.1.1 – Minimum performance standard

Standards set forth in the EUROCAE ED-30, Minimum Performance Standards for Airborne Low-Range Radar Altimeter Equipment, dated March 1980 as modified by Appendix 1 to this ETSO.

The applicable Chapter 2 and Chapter 3 requirements are defined in Table 1 for the appropriate functional class.

Table 1

Low-Range Radio Altimeter Functional Class	Low-Range Radio Altimeter Class Description	Applicable requirements in ED-30
A	Approach and landing	2.1-2.8, 3.1.1, 3.2.1 (all), 3.3.1
B	Terrain Avoidance (ground proximity warning systems)	2.1-2.8, 3.1.2, 3.2.3 (all), 3.3.2

Note: It is possible for a radio altimeter to meet both functional classes.

3.1.2 — Environmental standard

See CS-ETSO, Subpart A, paragraph 2.1.

3.1.3 — Software

See CS-ETSO, Subpart A, paragraph 2.2.

3.1.4 — Airborne electronic hardware

See CS-ETSO, Subpart A, paragraph 2.3.

3.2 — Specific

3.2.1 Failure condition classification

There is no standard minimum failure condition classification for this TSO. The failure condition classification appropriate for the equipment will depend on the intended use of the equipment in a specific aircraft.

4 — Marking

4.1 — General

Marking as detailed in CS-ETSO, Subpart A, paragraph 1.2.

4.2 — Specific

None.

5 — Availability of referenced document

See CS-ETSO, Subpart A, paragraph 3.

ETSO-C87a

Date: 12.07.2013

APPENDIX 1
MODIFICATIONS AND ADDITIONS TO EUROCAE ED-30
FOR MINIMUM PERFORMANCE STANDARDS FOR LOW-RANGE RADIO ALTIMETERS

1.0. ED-30 REQUIREMENT MODIFICATIONS

1.1. ED-30 Paragraph 1.3 (Radio Altimeters with Auto-Surveillance). ETSO-C87a does not include a separate category for monitoring. Design the radio altimeter to support the failure condition classification of the intended installation.

1.2. ED-30 Paragraph 2.2 (Transmitter Operating Frequency). Add the following requirement to ED-30, paragraph 2.2: The radio altimeter shall meet the International Telecommunication Union (ITU) regulations, if applicable.

1.3. ED-30 Paragraph 2.5 (Failure Warning). Add the following sentence to the beginning of ED-30, paragraph 2.5, to clarify that a failure detection system is required: 'A failure detection system must be incorporated in the equipment to indicate to the pilot, and to any systems utilizing the radio altimeter data, of a failure of the radio altimeter to accomplish its intended function because of the following conditions: (1) Loss of power, and (2) Loss of signal or altitude sensing capability when within the manufacturer's stated operating altitude range.'

1.4. ED-30 Paragraph 3.2.2 (Category A2). ETSO-C87a does not include Category A2. If alternate accuracy requirements not meeting the requirements of paragraph 3.2.1 are desired, the applicant should apply for a deviation in accordance with paragraph 3.g. of this ETSO.

1.5. ED-30 Paragraph 3.2.4 (Category C). ETSO-C87a does not include Category C. If the radio altimeter has been designed and tested to tighter accuracy requirements, include the design information, test results, and limitations with the application for ETSO and document the performance in the installation manual.

1.6. ED-30 (Appendix). The ED-30 appendix references TSO-C87 and RTCA/DO-123 for external loop loss standards. As TSO-C87 and DO-123 are no longer current, reference RTCA/DO-155, *Minimum Performance Standards Airborne Low-Range Radar Altimeters*, Appendix B, for external loop loss standards instead.

2.0. REQUIREMENT ADDITIONS to ED-30: Rate Data. The equipment need not provide a rate data output as a condition of compliance with this minimum performance standard. Altimeters with rate outputs must meet the following accuracy requirements for at least 95 percent of all observations for heights from the terrain to the antenna:

RATE DATA		
Height (ft)	Range (ft/sec)	Accuracy (ft/sec)
3-100	0-15	± (1.5 ft.+ 0.01 h + 0.1 /r/)
100-200	0-20	± (2.0 ft.+ 0.01 h + 0.1 /r/)

Where: h = altitude in feet; and /r/ = absolute value of rate (feet/sec.)