

## **‘AMC and GM to SERA — Issue 1, Amendment 6’**

The Annex to ED Decision 2013/013/R is amended as follows:

The text of the amendment is arranged to show deleted, new or amended text as shown below:

- (a) deleted text is ~~struck through~~;
- (b) new or amended text is highlighted in **blue**;
- (c) an ellipsis ‘[...]’ indicates that the remaining text is unchanged.

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## AMC1 SERA.6005(c) Requirements for communications, SSR transponder and electronic conspicuity in U-space airspace

### MEANS OF TRANSMISSION OF INFORMATION AND INFORMATION TO BE TRANSMITTED

(a) Manned aircraft should transmit information through one or more of the following means to continuously make themselves electronically conspicuous to U-space service providers:

(1) A certified ADS-B OUT system compliant with ICAO Annex 10 Volume IV Chapter 5 (Mode-S Extended Squitter).

(2) A certified ADS-B OUT system compliant with ICAO Annex 10 Volume III Chapter 12 (Universal Access Transceiver) 12 months after its implementation and deployment for that purpose in all Member States.

(3) A system that transmits the information specified in Appendix 1 to this AMC using:

(i) a short-range device (SRD) 860 frequency band, and the information is transmitted in compliance with the format as documented in technical specification ADS-L 4 SRD-860;

(ii) standardised mobile telecommunication network services coordinated for aerial use in the relevant decisions of the Electronic Communication Committee (ECC) of the European Conference of Postal and Telecommunications Administrations (CEPT), and the information is transmitted in compliance with the format as documented in technical specification ADS-L 4 MOBILE. The aircraft operator using application-based service should ensure that all other applications or functions that might run in the background are switched off or made inactive to limit in-flight transmissions to only those necessary to minimise interference through unpredictable data upload.

This option becomes applicable 6 months after the publication of the technical specification ADS-L 4 MOBILE.

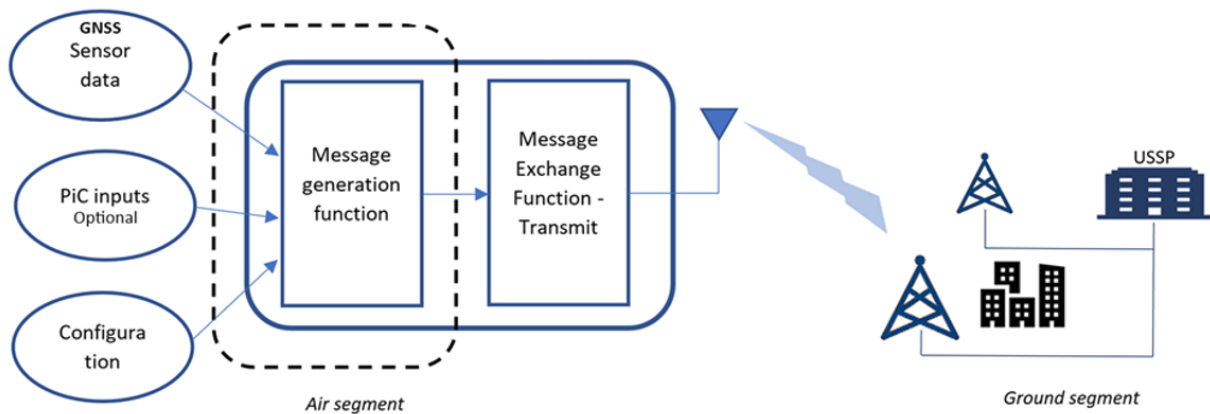
The systems used for transmission in accordance with points (3)(i) and (ii) should bear an appropriate CE marking, and be either installed on the aircraft with the installation approved by the competent authority or carried on board the aircraft as non-installed equipment.

(b) The information specified in Appendix 1 to this AMC, and which is transmitted through a system referred to in points (3)(i) and (ii), shall be transmitted in a machine-readable format accessible to U-space service providers without any restrictions.

## Appendix 1 to AMC1 SERA.6005(c) Requirements for communications, SSR transponder and electronic conspicuity in U-space airspace

### ADS-L MESSAGE GENERATION FUNCTION

- (a) This AMC details the minimum set of parameters that should be transmitted, and a set of parameters that may be optionally transmitted.
- (b) All parameters should originate from a position source or from the system configuration. Each ADS-L message should include an identifier unique to the transmission source.



**Figure 1: The scope of the ADS-L message generation function (dashed line) as specified in Appendix 1 to AMC1 to SERA.6005(c)**

### TRANSMITTED PARAMETERS

Data type	Parameter	Required/optional	Remarks	Source
<b>Aircraft address</b>	Unique identifier / address	Required	Should be included in each transmission	Configuration
	Address type	Required	See the table below	Configuration
<b>Time</b>	Timestamp	Required		Position source
<b>Aircraft identification</b>	Aircraft category	Required	See the table below	Configuration
<b>Emergency status</b>	Emergency status	Optional	See the table below	Pilot-in-command inputs
<b>Position</b>	Latitude	Required	Reference WGS-84	Position source
	Longitude	Required	Reference WGS-84	Position source
	GNSS altitude	Required	Reference WGS-84 Height Above Ellipsoid (HAE)	Position source
<b>Velocity/track</b>	Ground speed	Required	Alternatively, north-south, east-west velocities	Position source
	Ground track	Required		Position source

	Vertical rate	Required		Position source
	Velocity accuracy	Optional	See the table below	Position source
Capabilities and status	Version	Required	To facilitate interoperability	Configuration
	Design assurance	Optional	See the table below	Configuration
	Horizontal position accuracy	Required	95 % confidence See table below	Position source
	Vertical position accuracy	Required	95 % confidence See the table below	Position source
	Navigation integrity	Optional	Containment radius (Rc) See table below	Position source
	Source integrity level	Optional	Probability that Rc is exceeded See the table below	Configuration

**TABLES FOR REQUIRED PARAMETERS**

Data type	Values
Address type	Reserved
	ICAO
	Unique identifier
	Reserved

Parameter	Values
Aircraft category	No emitter category information available
	Light fixed-wing (<7 031 kg / 15 500 lb)
	Small to heavy fixed-wing (≥7 031 kg / 15 500 lb)
	Light rotorcraft
	Heavy rotorcraft
	Glider/sailplane
	Lighter-than-air
	Ultralight
	Hang-glider
	Paraglider
	Parachutist/skydiver/wingsuit
	eVTOL/UAM
	UAS 'open' category
	UAS 'specific' category
	UAS 'certified' category
Model plane	
Reserved	

Parameter	95 % horizontal accuracy bound
	EPU ≥ 926 m (0.5 NM)
	EPU < 926 m (0.5 NM)
	EPU < 555.6 m (0.3 NM)
	EPU < 185.2 m (0.1 NM)

	EPU < 92.6 m (0.05 NM)
	EPU < 30 m
	EPU < 10 m
	EPU < 3 m

Data type	95 % geometric altitude accuracy
Vertical position accuracy	Unknown or > 150 m
	≤ 150 m
	≤ 45 m
	≤ 15 m

**TABLES FOR OPTIONAL PARAMETERS**

Parameter	Values
Emergency status	No emergency
	General emergency
	Lifeguard/medical emergency
	Minimum fuel (Energy)
	No communications
	Unlawful interference
	Downed aircraft
	Reserved

Parameter	Horizontal Figure of Merit for rate (HFOMr) values
Velocity accuracy	Unknown or ≥ 10 m/s
	< 10 m/s
	< 3 m/s
	< 1 m/s

Parameter	Software and hardware DAL
Design assurance	n/a
	D
	C
	B

Parameter	Rc
Navigation integrity	≥ 20 NM
	< 20 NM
	< 8 NM
	< 4 NM
	< 2 NM
	< 1 NM
	< 0.6 NM
	< 0.2 NM
	< 0.1 NM
	< 75 m
	< 25 m

	< 7.5 m
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Parameter	Probability of exceeding Rc
Source integrity level	Unknown or > 1E-3 / FH
	≤ 1E-3 / FH
	≤ 1E-5 / FH
	≤ 1E-7 / FH

### TRANSMISSION RATE

The *position* and *velocity/track* parameters should be transmitted at a rate of at least 1 Hz. The transmission of other parameters may be less frequent than 1 Hz, but not less frequent than 0.1 Hz.

### ERROR CONTROL

There should be at least a digital error detection technique at one level of the transmission (e.g. cyclic redundancy check (CRC)). No specific error-control means are prescribed.

### SECURITY

The transmission should be protected to ensure security and confidentiality of the exchanged parameters.

### POSITION SOURCE

The *horizontal and vertical position* and *velocity/track* parameters should primarily be based on a GNSS source.

## GM1 SERA.6005(c) Requirements for communications, SSR transponder and electronic conspicuity in U-space airspace

### POSITION SOURCE

It is recommended that the GNSS position source process more than one constellation and/or use SBAS augmentation if available.

### USE OF THE 'HARDWARE AND SOFTWARE DAL' PARAMETER

The development assurance parameter is a provision to indicate the system's hardware and software development assurance levels (DALs), if applicable. Further information on DAL determination and use may be found in aeronautical standards for certification of software and hardware items, such as ED-80 and ED-12().

### INSTALLED SYSTEMS

- (a) Certified ADS-B OUT systems compliant with ICAO Annex 10 that are implemented and deployed for that purpose in all Member States.

The systems may be installed in accordance with CS-ACNS (Subpart D Section 4) or CS-STAN (Standard Change CS-SC005 *INSTALLATION OF AN ADS-B OUT SYSTEM COMBINED WITH A TRANSPONDER SYSTEM*), or AMC 20-24. The installation of the system should be approved by the competent authority.

- (b) Systems using an SRD 860 frequency band or standardised mobile telecommunication network services coordinated for aerial use in Europe.

The installation of a system in an aircraft, for which EASA is the competent authority for the aircraft design, should be performed in accordance with the EASA aircraft design change processes or in accordance with CS-STAN (CS-SC0051 *INSTALLATION OF 'FLARM' EQUIPMENT*, and CS-SC0057 *INSTALLATION OF AN ELECTRONIC CONSPICUITY (EC) FUNCTION*).

- (c) The installation of a system in an aircraft, for which an aviation competent authority is the authority for the aircraft design, should be performed in accordance with the aircraft design change processes defined by the relevant authority. Aviation competent authorities may make use of recognised standards (e.g. CS-STAN) for technically similar installations in aircraft specified in Annex I to Regulation (EU) 2018/1139.

#### **DECLARATION OF COMPLIANCE**

The manufacturer of a system referred to in points (a)(3)(i) and (ii) of AMC1 SERA.6005(c) may declare conformity of its system with point SERA.6005(c). The declaration should be supported by technical documentation showing compliance. Alternatively, the manufacturer may voluntarily ask for a technical evaluation of its system by a competent authority. Such declarations of conformity and technical evaluations may be used by aircraft operators to demonstrate to competent authorities compliance with point SERA.6005(c).

#### **NON-INSTALLED EQUIPMENT**

- (d) The carriage of non-installed equipment on board the aircraft, for which EASA is the competent authority for the aircraft design, should comply with the applicable air operations requirements (points CAT.GEN.MPA.140, NCC.GEN.130, NCO.GEN.125, and SPO.GEN.130). The carriage of non-installed equipment on board the aircraft, for which an aviation competent authority is the authority for the aircraft design, should comply with the applicable air operations requirements defined by the relevant authorities. Aviation competent authorities may make use of the relevant EASA requirements for similar kinds of air operations with aircraft specified in Annex I to Regulation (EU) 2018/1139.
- (e) The equipment should be set up on board the aircraft in such a way so as to limit transmission obscuration by the airframe, human body, or other structures and at the same time maximise the visibility of the transmitting antennas, including those on the ground.

#### **MOBILE TELECOMMUNICATION SERVICES FOR AERIAL USE**

- (f) National and international roaming agreements rely on standardised roamed services (SMS, voice streaming, etc.), which cannot be automatically presumed for aerial services. Only the mobile telecommunication services concluded by the standardisation bodies for aerial use



could be used by manned aircraft to make themselves electronically conspicuous to U-space service providers.

- (g) There are country-specific restrictions for the aerial use of certain mobile telecommunication frequencies. Therefore, the frequencies used by aerial mobile telecommunication services should be consistent with the relevant decisions of the Electronic Communication Committee (ECC) of the European Conference of Postal and Telecommunications Administrations (CEPT) as implemented by national telecommunication authorities.

#### **MILITARY AND STATE AIRCRAFT OPERATIONS**

- (h) Although the amendment to Implementing Regulation (EU) No 923/2012 introduced by Implementing Regulation (EU) 2021/666 does not apply to military and State aircraft operations and training, these aircraft may fully or partially operate in the U-space airspace. Military and State organisations may reserve the right not to be electronically conspicuous to U-space service providers, taking both security and safety requirements into account.
- (i) At national level, coordination between authorities in charge of civil and military/State aircraft should assess the risk of electronically non-conspicuous military and State aircraft operating in U-space airspace and may specify means by which the presence and or location of such aircraft may be communicated by the relevant operational units.
- (j) In determining the designation of an area as U-space airspace, States should consider operations and training conducted with manned military and State aircraft in the airspace concerned and the ability or otherwise to be conspicuous, whether for technical or operational reasons.

#### **SAFEGUARDS FOR CONTINUOUS TRANSMISSION**

- (k) U-space service providers may use the provisions of Article 18(h) of Implementing Regulation (EU) 2021/664 to inform the competent authority about any known irregularities in the continuous transmission of the systems that make manned aircraft electronically conspicuous to U-space service providers, particularly if such irregularities may negatively affect the provision of air traffic information services as referred to in Article 11 of that Regulation.
- (l) Manned aircraft that operate in U-space airspace should use the provisions of Regulation (EU) No 376/2014 for reporting any known irregularities in the continuous transmission of the systems used for making them electronically conspicuous to U-space service providers.
- (m) The competent authority should, in case of an urgent safety problem, determine a corrective action (including directives or recommendations) to be taken by a natural or a legal person, where this is necessary to safeguard the safety of traffic information service.