

## CS-STAN ISSUE 4 — CHANGE INFORMATION

EASA publishes amendments to the Certification Specifications for Standard Changes and Standard Repairs as consolidated documents. These documents are used for establishing the certification basis for applications made after the date of entry into force of the applicable issue/amendment.

Consequently, except for a note '[Issue: STAN/4]' under the amended paragraph, the consolidated text of CS-STAN does not allow readers to see the detailed changes that have been introduced compared to the previous issue/amendment. To allow readers to also see them, this document has been created. The same format/layout has been used as for the publication of notices of proposed amendments (NPAs):

- deleted text is ~~struck through~~;
- new or amended text is highlighted in blue;
- an ellipsis '[...]' indicates that the rest of the text is unchanged.

## SUBPART A — GENERAL

### CS STAN.00 Scope

These certification specifications for SCs/SRs contain design data with acceptable methods, techniques, and practices for carrying out and identifying SCs/SRs. SCs/SRs, designed in compliance with these certification specifications, are not subject to an approval process, and, therefore, can be embodied in an aircraft when the conditions set out in the relevant ~~points~~ paragraphs of ~~Part 21~~ Part-21<sup>1</sup> for SCs/SRs, i.e. 21.A.90B or 21.A.431B, are met.

Subpart B and Subpart C contain a list of ~~SCs~~ standard changes and ~~SRs~~ repairs permitted under ~~point~~ 21.A.90B or 21.A.431B. Other changes/repairs not included in these ~~s~~Subparts cannot be considered ~~as~~ SCs/SRs. In particular, CS-STAN cannot not be used to install or exchange integrated avionics or ~~communications~~, navigation or ~~surveillance~~ systems, unless explicitly allowed.

Acceptable means of compliance for the release to service of aircraft modified or repaired through ~~the~~ embodiment of SCs or SRs are provided in ~~AMC~~ M.A.801 or ~~AMC1~~ ML.A.801, as applicable. Additional limitations are introduced in certain SCs/SRs, depending on their complexity, for example, the 'pilot-owner' is often not allowed to release the aircraft into service.

Note: ~~SCs~~ Standard Changes and ~~SRs~~ Standard Repairs are not meant to be used in serial production.

[...]

### CS STAN.42 Environmental conditions

If the equipment is required to meet the environmental conditions to be expected during normal operations, the following provides appropriate guidance:

- Ensure that the equipment manufacturer has declared that the equipment is suitable for installation on a specific aircraft type and for the operations defined in the standard change (SC). This statement could be included in a document (e.g. a DDP, CMM, etc.) issued by the equipment manufacturer, or in a written communication (e.g. email).

### CS STAN.47 Internal lithium batteries

If lithium batteries are included in the equipment or are installed in a location not easily visible to the pilot(s), the following ensure acceptable conditions for their installation:

- The conditions from Standard Change SC034b(), tailored to the specific type of battery, are met (see Note 1 below); or
- The internal lithium battery does not exceed a Watt-hour (Wh) rating of 100 Wh (see Note 2 below) or 2 grams of lithium content. Lithium batteries have to be successfully tested against the UN *Manual of*

<sup>1</sup> Annex I (~~Part 21~~) to Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations and repealing Commission Regulation (EC) No 1702/2003 (OJ L 224, 21.8.2012, p. 1 ~~OJ L 243, 27.9.2003, p. 6~~) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R0748&qid=1614785552035>).

*Tests and Criteria*, Part III, Section 38.3 (latest revision). In case of doubt, the installer should ask the supplier or seller for evidence in the form of a summary test report, or for a written statement (e.g. an email) that the tests have been successful. Alternatively, consumer batteries should bear a CE marking. Such batteries are considered standard parts and are, therefore, eligible for installation without an EASA Form 1.

**Note 1:** Batteries authorised in accordance with ETSO C179(a) or a subsequent version are considered optimal; however, batteries authorised according to TSO-C179 are acceptable in this context.

**Note 2:** To calculate the number of Watt-hours, multiply the battery voltage by the Amp hours (Ah), unless the 'Watt-hour rating' or Wh is shown on the battery, its packaging or in the manufacturer documentation. Refer to SIB 2016-08 *Portable Electronic Devices belonging to the Operator*<sup>2</sup> and the EASA booklet on lithium batteries<sup>3</sup>.

## CS STAN.48 Installation check flights

Within the scope of CS-STAN, every time an installation check flight is listed among the activities to be performed in order to embody a SC or a SR in the aircraft, the pilot conducting the installation check flight must:

- make sure that their ratings and flight experience are suitable for the technical content of the flight;
- receive an appropriate briefing; this briefing shall include:
  - a description of the SC to be implemented and the related system or equipment identified as potentially unreliable; and
  - the scope and the objective of the installation check flight;
- conduct a risk assessment and establish any necessary mitigating measures;
- identify the need for any additional crew member or task specialist(s), or both, if appropriate;
- establish the procedures, including relevant checklists, appropriate to the flight and any operating constraints.

Depending on the complexity of the installation test flight tasks and the complexity of the SC, the pilot may choose not to require a documented risk assessment, risk mitigation procedures, test procedures and checklists. This should be recorded in Block 6 of the EASA Form 123.

An installation check flight is considered part of the SC installation activity, and it can be conducted without an individual permit to fly or any other certificate of release to service for the SC installation, as long as there is no other ongoing maintenance activity on the aircraft (i.e. other maintenance, which has not yet been released to service).

## CS STAN.50 Instructions for Continuing Airworthiness (ICAs)

~~Due to~~ Depending on the SC/SR being embodied, the aircraft instructions for continuing airworthiness (ICAs) may need to be updated. This update is considered ~~to be~~ part of this SC/SR, and, therefore, requires no specific approval. A template that could be used for the supplement to the ICAs is provided in GM CS STAN.50.

<sup>2</sup> <https://ad.easa.europa.eu/ad/2016-08>

<sup>3</sup> [https://www.easa.europa.eu/sites/default/files/dfu/Background%20Information%20Lithium%20Batteries\\_update%20Sept%202017.pdf](https://www.easa.europa.eu/sites/default/files/dfu/Background%20Information%20Lithium%20Batteries_update%20Sept%202017.pdf)

## GM1 STAN.50 Instructions for continuing airworthiness (ICAs)

### TEMPLATE FOR A SUPPLEMENT TO THE ICAS

The template provided in this GM could be considered while drafting a supplement to the ICAs if the embodiment of a SC/SR has an impact on the existing ICAs.

The person that releases the aircraft after the embodiment of the SC/SR may need to adapt the text of the template to better address some specific details that are not covered in it.

The use of this template is not mandatory. The information that has to be provided according to the relevant SC/SR can be presented in a different way.

Additional guidance material:

- GAMA Specification No. 2: *Specification for Manufacturers Maintenance Data*<sup>4</sup>,
- FAA Advisory Circular AC 27-1B, *Certification of Normal Category Rotorcraft (Changes 1 - 8 incorporated)*, Appendix A<sup>5</sup>.

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<sup>4</sup> <https://gama.aero/facts-and-statistics/consensus-standards/publications/gama-and-industry-technical-publications-and-specifications/>

<sup>5</sup> [https://www.faa.gov/regulations\\_policies/advisory\\_circulars/index.cfm/go/document.information/documentID/74403](https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/74403)

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		Revision:
		Date:
Company approval reference, if any	Standard Change / Standard Repair reference	Page:

## AIRCRAFT TYPE

# SUPPLEMENT TO THE INSTRUCTIONS FOR CONTINUING AIRWORTHINESS (ICAs)

### LOG OF REVISIONS

<i>Edition</i>	<i>Revision</i>	<i>Date</i>	<i>Description</i>	<i>Page</i>

## 0 — Introduction

These instructions provide information to maintain and inspect the product to which they refer, installed on the specified aircraft.

These instructions are provided with each system/equipment, and will be provided to any owner of the system/equipment on request.

## 1 — Instructions for continuing airworthiness (ICAs)

The ICAs include:

- 1) a list of parts installed;
- 2) scheduled maintenance (maintenance programme);
- 3) troubleshooting;
- 4) the shelf life of the component(s);

### 1.1 List of parts installed

Item	Part number	Description	Quantity

### 1.2 Maintenance programme

Specify a maintenance programme that includes the frequency and extent of the maintenance tasks necessary to ensure the continued airworthiness of the aircraft.

Task reference number (possibly referring to ATA chapter)	Description (high level)	Interval (flight hours/cycles or calendar interval)	Reference to detailed maintenance instructions in Chapter 2	Remarks

### 1.3 Troubleshooting

If available, troubleshooting information describing probable malfunctions, how to recognise them, and the remedial action(s) for those malfunctions should be provided.

### 1.4 Shelf life of the component(s)

If the shelf life is provided by the component manufacturer, add the relevant information.

## 2 — Maintenance tasks

Insert here all maintenance tasks; each of them should list the following: the tools, the purpose of inspections/maintenance, and the operations to be performed.

### 3 — Vendor instructions (OEM)

If available, insert here a reference to the maintenance documentation released by the equipment manufacturer or the vendor.

Item	CMM

### 4 — Wiring diagram(s)

If applicable, insert here new or modified wiring diagram(s).

## CS STAN.60 Aircraft Flight Manual Supplement (AFMS)

Due to Depending on the SC/SR being embodied, the AFM may need to be updated. This manual supplement to the AFM is considered to be part of the SC/SR, and, therefore, requires no specific approval. A template that could be used for the supplement to the AFM is provided in GM1 STAN.60.

## GM1 STAN.60 Aircraft Flight Manual Supplement (AFMS)

### TEMPLATE FOR A SUPPLEMENT TO THE AFM

The template provided in this GM could be considered while drafting a supplement to an AFM if the embodiment of a SC/SR has an impact on the existing AFM.

The person that releases the aircraft after embodiment of the SC/SR may need to adapt the text of the template to better address some specific details that are not covered in it.

The use of this template is not mandatory. The information that has to be provided according to the relevant SC/SR can be presented in a different way.

Additional guidance material:

- GAMA Specification No. 1: *Specification for Pilot’s Operating Handbook*<sup>6</sup>,
- FAA Advisory Circular AC 27-1B, Subpart G — *Rotorcraft Flight Manual*<sup>7</sup>.

<sup>6</sup> <https://gama.aero/facts-and-statistics/consensus-standards/publications/gama-and-industry-technical-publications-and-specifications/>

<sup>7</sup> [https://www.faa.gov/regulations\\_policies/advisory\\_circulars/index.cfm/go/document.information/documentID/74403](https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/74403)

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## TITLE

A/C :

Version :

S/N :

Registration :

This Aircraft Flight Manual Supplement (AFMS) must be attached to the approved AIRCRAFT FLIGHT MANUAL (AFM) kept on board the aircraft.

The information contained in this document integrates and, in some cases, supersedes the information reported in the corresponding section of the approved AFM.

### LIST OF EFFECTIVE PAGES

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Edition	Revision	Date	Description	Page

## **GENERAL**

### **Introduction**

An AFM supplement (AFMS) should normally cover only a single system, device or piece of equipment, such as an autopilot, ski, or navigation system.

The AFMS should follow the same structure as the basic AFM to which the supplement applies (the same numbering of points/paragraphs, same layout). It should use the same terminology and definitions and, whenever applicable, present normal and emergency procedures in the same way they are presented in the basic AFM.

Each supplement should be a self-contained, miniature flight manual with at least the following:

### **Scope**

The purpose of the supplement and the system or equipment to which it specifically applies should be stated.

### **Limitations**

Any change to the limitations, markings or placards of the basic AFM should be stated. If there is no change, a statement to that effect should be made. Refer also to point CS STAN.20 in Subpart A.

### **Emergency procedures**

Any addition or change to the basic emergency procedures of the AFM should be stated. If there is no change, a statement to that effect should be made.

### **Normal procedures**

Any addition or change to the basic normal procedures of the AFM should be stated. If there is no change, a statement to that effect should be made.

### **Performance**

Any effect of the given installation upon the performance of the aircraft as shown in the basic AFM should be indicated. If there is no change, a statement to that effect should be made.

### **Weight and balance**

Any effect of the given installation upon the weight and balance of the aircraft should be indicated. If there is no change, a statement to that effect should be made.

## CS STAN.70 Acceptable Means of Compliance (AMC)

The AMC for the release to service of the aircraft after embodiment of the SC/SR, the eligibility of the persons entitled to perform this release, the parts and appliances suitable for use in a SC/SR and their identification, the documents to be produced and kept with the change/repair SC/SR, the required amendments to aircraft manuals, the EASA Form 123 (change/repair embodiment record), etc., are contained in AMC M.A.801 or AMC1 ML.A.801, as applicable, in Annex I to Decision No 2003/19/RM of 28 November 2003<sup>8</sup>.

## CS STAN.80 Definitions and abbreviations

[...]

'CMM' means component maintenance manual.

[...]

'complex motor-powered aircraft' means:

(i) an aeroplane:

- with a maximum certified take-off mass exceeding 5 700 kg; or
- certified for a maximum passenger seating configuration of more than 19; or
- certified for operation with a minimum crew of at least 2 pilots; or
- equipped with a turbojet engine(s) or more than 1 turboprop engine; or

(ii) a helicopter certified:

- for a maximum take-off mass exceeding 3 175 kg; or
- for a maximum passenger seating configuration of more than 9; or
- for operation with a minimum crew of at least 2 pilots; or

(iii) a tilt-rotor aircraft.

[...]

'EASA Form 1' means the form associated with an aircraft part that certifies that the part has been produced or maintained in conformity with approved design data and is in a condition for safe operation. According to point 21.A.307 of Regulation (EU) No 748/2012, parts can only be installed in a type-certified product if accompanied by an EASA Form 1. Standard parts and certain parts that fulfil the conditions described in point 21.A.307 of Regulation (EU) No 748/2012 are exempted from this requirement. These certain parts include parts identified in CS-STAN as not requiring an EASA Form 1.

Some bilateral agreements signed between the European Union (EU) and a third country recognise a certificate issued in accordance with a third-country regulation as being equivalent to an EASA Form 1, entitling the installation of a part, accompanied by the equivalent form, in an EU-registered aircraft.

**Note:** When a part is eligible for installation without an EASA Form 1, this does not exclude the possibility of installing a part with a recognised release document (i.e. an EASA Form 1).

<sup>8</sup> <https://www.easa.europa.eu/document-library/agency-decisions/ed-decision-2003019rm>

[...]

‘Electronic conspicuity (EC)’ is an umbrella term for a range of technologies that, in their most basic form, transmit the position of the host aircraft to other airspace users that operate compatible equipment. More advanced devices can also transmit and receive, display and alert pilots to other/conflicting air vehicles that have compatible EC devices. Such EC devices can also provide additional functions. EC devices turn the traditional ‘see and avoid’ concept into ‘see, BE SEEN, and avoid’<sup>9</sup>.

[...]

‘IAS’ means ~~international standard atmosphere~~ indicated airspeed.

[...]

‘Primary structure’ means a structure that carries flight, ground, crash or pressurisation loads. Structures retaining items of mass or critical equipment, those providing a handhold, or those carrying crash loads (such as floor panels) are considered primary structures.

‘1090-MHz non-transponder devices (NTDs)’ are stand-alone transmitters and are intended to be used by aircraft not equipped with Mode S transponders that need to generate ADS-B OUT messages. The use of such units targets GA aircraft. Those aircraft may only have Mode S air traffic control radar beacon system (ATCRBS) transponders. For these devices, the DF field shall be set to DF = 18. TCAS and Mode S interrogators do not benefit from the ADS-B information from the NTD. Aircraft equipped with an ATCRBS transponder and an NTD emitter generate more interference than a transponder-based 1090-MHz extended squitter ADS-B transmitter.

‘Pilot-owner’ means a person qualified in accordance with ~~point~~ M.A.803–(a) of Annex I (Part-M) ~~or point~~ M.L.A.803(a) of Annex Vb (Part-ML) ~~to~~ Regulation (EU) No 1321/2014.

‘Secondary structure’ means a structure which is not a primary structure which carries primarily air or inertial loads, and whose failure would not reduce the structural integrity of the airframe or prevent the aircraft from continuing safe flight and landing. Examples of external secondary structures are fairings, cowlings, landing gear doors and radomes. Examples of internal secondary structures are linings.

‘Transponder-based 1090-MHz extended squitter ADS-B transmitters’ couple a Mode S transponder with ADS-B reports. In this case, the ADS-B message generation function, the radio frequency modulator, and the 1090-MHz transmitter reside in the transponder itself. The downlink format (DF) field shall be set to DF = 17 for all ADS-B message transmissions.

‘VLR’ means very light rotorcraft.

<sup>9</sup> See UK CAA *Electronic conspicuity devices* — Guidance on devices for electronic identification of light aircraft, available at <https://www.caa.co.uk/General-aviation/Aircraft-ownership-and-maintenance/Electronic-Conspicuity-devices/>.

## SUBPART B — STANDARD CHANGES

### LIST OF STANDARD CHANGES

#### Group Systems — Communication:

- CS-SC001~~ab~~ — Installation of VHF voice communication equipment
- CS-SC002~~ed~~ — Installation of Mode S elementary surveillance equipment
- CS-SC003~~ed~~ — Installation of audio selector panels and amplifiers
- CS-SC004~~ab~~ — Installation of antennas
- ~~CS-SC~~SC005~~ab~~ — Installation of an ADS-B OUT system combined with a transponder system
- CS-SC006a — Exchange of a COM, NAV or NAV/COM unit for a combined VHF voice communication and navigation (NAV/COM) unit

#### Group Systems — Electrical:

- CS-SC031~~bc~~ — Exchange of conventional ~~A~~anti-~~C~~ollision ~~L~~ights, ~~P~~osition ~~L~~ights, ~~and~~ ~~L~~anding ~~and~~ ~~&~~ ~~T~~axi lights ~~for~~ ~~by~~ LED-type lights
- CS-SC032~~bc~~ — Installation of anti-collision lights
- CS-SC033~~ab~~ — Installation of cabin and cockpit conventional lights ~~by~~ ~~for~~ LED-type lights
- CS-SC034~~bc~~ — Exchange of an existing battery for a lithium iron phosphate (LiFePO<sub>4</sub>) battery system
- CS-SC035~~ab~~ — Installation of solar cells on sailplanes
- CS-SC036~~ab~~ — Installation of visual awareness lights
- CS-SC037~~ab~~ — Exchange of a main aircraft battery
- CS-SC038~~ab~~ — Installation of DC ~~to~~ DC converters

#### Group Systems — Avionics/NAV/Instruments:

- CS-SC051~~ed~~ — Installation of 'FLARM' equipment
- CS-SC052~~ed~~ — Installation of ~~VFR~~ GNSS equipment
- CS-SC053b — Installation of ~~R~~adio ~~M~~arker ~~R~~eceiving equipment
- CS-SC054b — Exchange of ~~D~~istance ~~M~~easur~~ing~~ ~~E~~quipment (DME)
- CS-SC055~~bc~~ — Exchange of ADF equipment
- CS-SC056~~bc~~ — ~~Installation~~ ~~Exchange~~ of VOR equipment
- ~~CS-SC~~SC057a — ~~Reserved~~ Installation of an electronic conspicuity (EC) function
- ~~CS-SC~~SC058a — Installation of traffic awareness beacon system (TABS) equipment
- CS-SC059a — Installation of a gyroscopically stabilised direction indicator
- CS-SC060a — Installation of a secondary attitude indicator
- CS-SC061a — Installation of an aircraft tracking system

**CS-SC062a — Installation of an awareness function or awareness device**

## Group Systems — Mechanical and structural:

- CS-SC081~~ab~~ — Exchange of tyres (inner tubes/outer tyres)
- CS-SC082~~ab~~ — Exchange of skids on wing tips/fuselage tails
- CS-SC083~~ab~~ — Exchange of flexible seals on control surfaces
- CS-SC084a — Repainting of composite aircraft structures
- CS-SC085a — Exchange of an aircraft livery paint and decorative sticker scheme
- CS-SC086~~ab~~ — Exchange of a balloon **bottom end** ~~'bottom-end'~~
- CS-SC087a — Installation of balloon spare parts**

## Group Cabin:

- CS-SC101~~bc~~ — Installation of emergency locator transmitter (ELT) equipment/**satellite personal locator beacon**
- CS-SC102~~ab~~ — Installation of DC power supply systems (**DC-PSSs**) for portable electronic devices (PED**s**)
- CS-SC103a — Exchange of interior material covering floor, sidewall and ceiling
- CS-SC104~~ab~~ — Installation of lightweight in-flight recording systems
- CS-SC105~~ab~~ — Installation of mounting systems to hold equipment
- CS-SC106~~ab~~ — Installation of flight~~time~~ recorders
- CS-SC107~~ab~~ — Installation of carbon monoxide (**CO**) detectors
- CS-SC108a — Exchange of handheld fire extinguishers for halon-free types**
- CS-SC109a — Installation of handheld fire extinguishers**
- CS-SC110a — Installation of annunciators**

## Group Survivability Equipment:

- CS-SC151b — Installation of headrests
- CS-SC152~~bc~~ — Changes to seat cushions, including the use of alternative foam materials
- CS-SC153b — Exchange of safety belts / torso restraint systems

## Group Powerplant and fuel systems:

- CS-SC201b — Exchange of powerplant instruments
- CS-SC202~~bc~~ — Use of **aviation gasoline (Avgas)** UL 91
- CS-SC203~~bc~~ — Use of **aviation gasoline (Avgas)** Hjelmcø 91/96 UL and 91/98 UL
- CS-SC204~~ab~~ — Installation of **an** externally~~ly~~ powered engine preheater
- CS-SC205a — Installation of fuel low-level sensor (FLLS)

CS-SC206-~~a~~b — Exchange of fixed-pitch wooden propellers

CS-SC207-~~a~~b — Exchange of the fuel cylinders on hot-air balloons

CS-SC208a — Installation of a multifunction display for powerplant instruments

CS-SC209a — Exchange of a propeller governor

CS-SC210a — Installation of a fuel flow/pressure instrument

Group Flight:

CS-SC251~~b~~c — Installation of an angle-of-attack (AoA) indicator system

CS-SC252a — Installation of a tactile stall-warning indicator system

CS-SC253a — Installation of a device receiving uplinked weather radar information

Group Miscellaneous:

CS-SC401~~e~~d — ~~Installation~~ Exchange of basic flight instruments

CS-SC402~~b~~c — Installation of sailplane equipment

CS-SC403-~~a~~b — Provisions for the installation of lightweight cameras

## Standard Change CS-SC001<sup>ab</sup>

### INSTALLATION OF VHF VOICE COMMUNICATION EQUIPMENT

#### 1. Purpose

Exchange of communications (COM) equipment, and for aircraft limited to VFR operation, also installation of COM equipment. This SC does not include installation of antennas.

#### 2. Applicability/Eligibility

Aeroplanes that are not complex motor-powered aircraft with a maximum cruising speed in ISA conditions below 250 kts IAS, rotorcraft ~~not being that are not~~ complex motor-powered aircraft, and any ELA2 aircraft.

*Note:* The reference to IAS in the condition for the maximum speed originates from the Standardised European Rules of the Air (SERA) for the classification of airspace. The maximum cruising speed is intended to limit the likelihood (number of eligible installations) and the consequences (less pressure for the air traffic controller to coordinate the issue with the next ATC sector) that could arise from eligible installations and lead to a loss of or a degradation of air-ground voice communications.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapter 2.

Additionally, the following conditions apply:

- The equipment is authorised in accordance with any of the following technical standards: JTSO-2C37d, JTSO-2C37e, ETSO-2C37e, JTSO-2C38d, JTSO-2C38e, ETSO-2C38e or ETSO-2C169a, or later amendments, or equivalent standards.
- The equipment is capable of 8.33-kHz and 25-kHz channel spacing.
- If the existing antenna cable is compliant with M17/28-RG58 (or equivalent standards, as specified for low operating temperatures), it may be reused, but it is recommended that it should be replaced with a cable compliant with M17/128-RG400 (PTFE) or equivalent standards.
- An installation check flight is conducted to confirm that the transmission and reception are adequate. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights. Alternatively, the installer may use the manufacturer instructions to check that the transmission and reception are adequate.

~~— The minimum output power specified for the radio is sufficient for the operation depending on the maximum flight level of the aircraft. The table below is valid for standard antenna installations (antenna type and position) with standard cable length less than 4 m and 2 connectors:~~

Maximum aircraft Flight Level (FL)	Minimum output power
up to 100	4 Watts
100 to 150	6 Watts
150 to 200	8 Watts
200 to 250	10 Watts

Maximum aircraft Flight Level (FL)	Minimum output power
250 to 300	12 Watts
300 to 400	16 Watts

~~For different installations (cable length, connectors), the required output power needs to be assessed by additional analysis:~~

- The equipment is ~~qualified~~ suitable for the environmental conditions to be expected during normal operations; ~~see CS STAN.42 in Subpart A for guidance.~~
- ~~The~~ instructions and tests defined by the equipment manufacturer ~~have to~~ must be followed.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

The ~~installation of the~~ equipment ~~installation~~ cannot be used to extend the operational capability (e.g. from VFR to IFR operation) of the specific aircraft ~~(e.g. from VFR to IFR operation).~~

In the case of rotorcraft approved for NVIS, ~~if cockpit panels are to be inserted~~, the change cannot be considered an SC.

#### 5. Manuals

Amend the AFM with ~~an~~ AFMS ~~that~~ contains ~~ing~~ or references ~~ing~~ the equipment instructions for operation, as required.

Amend the Instructions for ~~Continuing~~ Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for ~~the~~ release to service ~~of the aircraft~~ by the ~~P~~ pilot-owner.

## Standard Change CS-SC002<sup>ed</sup>

### INSTALLATION OF MODE S ELEMENTARY SURVEILLANCE EQUIPMENT

#### 1. Purpose

This SC is for the installation of a Mode S transponder, including, optionally, an altitude encoder.

The individual installation of an altitude encoder is covered by this SC.

This SC does not include the installation of antennas (see CS-SC004<sup>()</sup>), which may be applied concurrently).

Note: SC-CS005<sup>()</sup> refers to the installation of ADS-B OUT equipment.

#### 2. Applicability/Eligibility

~~This SC is applicable to aeroplanes that are not complex motor-powered aircraft, and which have a maximum cruising speed in ISA conditions below 250 kt TAS, to rotorcraft that are not complex motor-powered aircraft, and to any ELA2 aircraft.~~

This SC is applicable to:

- aeroplanes and rotorcraft that are not complex motor-powered aircraft provided that they do not have to comply with the ADS-B parts of the surveillance performance and interoperability (SPI) Regulation<sup>10</sup>;
- any ELA2 aircraft.

*Note:* In this SC, the SPI Regulation designates Regulation (EU) No 1207/2011 and all its subsequent amendments. Such amendments currently include Regulations (EU) No 1028/2014, (EU) 2017/386 and (EU) 2020/587.

This SC may be used for eligible aircraft as a means of compliance with the Mode S elementary surveillance (ELS) parts of the SPI Regulation.

#### 3. Acceptable methods, techniques, and practices

The following standards contains acceptable data:

- FAA Advisory Circular AC 43.13-1B, Chapter 11 or ASTM F2639-18 or subsequent revisions; and
- FAA Advisory Circular AC 43.13-1B, Chapter 12.

Additionally, the following conditions apply:

- The transponder equipment and its installation meet point CS ACNS.D.ELS.010 characteristics relevant for non-complex motor-powered aircraft. ~~of CS-ACNS,~~ and Additionally, the altitude encoder meets ETSO-C88a, or later amendments, or its equivalent.
- The elementary surveillance system provides relevant data according to CS ACNS.D.ELS.015.
- If automatic determination of the on-the-ground status is not available, the on-the-ground status is set to 'airborne'.
- The reported pressure altitude is obtained from an approved source that is connected to the static pressure system that provides pressure to the instrument used to control the aircraft.

<sup>10</sup> Commission Implementing Regulation (EU) No 1207/2011 of 22 November 2011 laying down requirements for the performance and the interoperability of surveillance for the single European sky (OJ L 305, 23.11.2011, p. 35) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32011R1207&qid=1649776306407>).

- Any antenna connected to the transponder has a resulting radiating pattern, which is vertically polarised, omnidirectional in the horizontal plane, and has sufficient vertical beam width to ensure proper system operation during normal aircraft manoeuvres.
- The equipment is ~~qualified~~ suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for ~~γυιδανχε.~~
- The installation instructions from the equipment manufacturer have to be followed.
- A system ground test that verifies all the transmitted data according to CS ACNS.D.ELS.015 has to be performed.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

In the case of aircraft approved for NVISs/NVGs, ~~if control/display panels are to be inserted,~~ the change cannot be considered ~~to be an~~ a SC.

If a Class A TABS device is already installed in the aircraft, the Mode S transponder system cannot be installed using CS-STAN.

#### 5. Manuals

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

Amend the ~~Instructions for Continuing Airworthiness~~ (ICAs) to establish maintenance actions/inspections and intervals, as required. ~~In particular, include in the ICAs a check with content that is similar to the provisions of the latest revision of EASA SIB No.: 2011-15:~~

~~— at intervals defined and published by the competent authority, or~~

~~— at intervals defined in the latest revision of EASA SIB No.: 2011-15.~~

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC003<sup>ed</sup>

### INSTALLATION OF AUDIO SELECTOR PANELS AND AMPLIFIERS

#### 1. Purpose

This SC is for the installation of audio selector panels and amplifiers.

Audio selector amplifiers that feature automatic speech recognition are eligible for installation by means of this SC only if the automatic speech recognition feature is disabled.

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes and to rotorcraft that are not complex motor-powered aircraft, and **to** any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapter 2; and
- FAA Advisory Circular AC 43.13-1B, Chapter 11 **or ASTM F2639-18 or subsequent revisions.**

Additionally, the following conditions apply:

- the equipment is authorised in accordance with ETSO-C50c or ETSO-C139a, or later amendments, or ~~the~~ equivalent **standards;**
- the equipment has at least the audio functionality of the previously installed equipment, and is compatible with the existing installation;
- the equipment is compatible with the connections to the existing communication and navigation systems;
- The equipment is ~~qualified~~ **suitable** for the environmental conditions to be expected during normal operations; **see CS STAN.42 in Subpart A for guidance;** and
- the instructions and tests defined by the equipment manufacturer are followed.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

Any limitations of the existing installation remain valid.

In the case of aircraft approved for NVISs/NVGs, ~~if control/display panels are to be inserted,~~ the change cannot be considered ~~to be an~~ **a** SC.

#### 5. Manuals

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

If the audio selector includes connections to equipment with functions that are not part of the aircraft's control system or navigation system, and which may emit distracting sounds, add a limitation in the AFMS stating that these functions shall not be used during take-off and landing. Examples of such functions include telephony, personal messaging functions and music players.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

**6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC004<sup>ab</sup>

### INSTALLATION OF ANTENNAS

#### 1. Purpose

This SC covers the installation and exchange of antennas other than RADAR and directional SAT/COM antennas. For aircraft certified to operate in known icing conditions, this SC only covers the exchange of antennas.

The installation of large antennas (such as High-Frequency (HF) or Direction-Finding (DF) antennas) in rotorcraft is not covered by this SC.

**Note:** For the purpose of this SC, RADAR includes, for example, weather radar, surveillance radar, etc. A transponder is an automated transceiver that replies to interrogations. This SC can be used to install a transponder antenna.

#### 2. Applicability/Eligibility

Aeroplanes and rotorcraft that are not being complex motor-powered aircraft, ~~rotorcraft not being complex motor-powered aircraft~~ and any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapter 1 and 3; and
- FAA Advisory Circular AC 43.13-1B, Chapter 11, Section 15 (on electrical bonding) or ASTM F2639-18 or subsequent revisions;
- FAA Advisory Circular AC 43-214 A, Chapters 8, 9 and 10 (for the case of drilling or structural bonding on existing composite materials); and
- FAA Advisory Circular AC 21-26 A (if the installer manufactures the antenna fairing).

Additionally, the following conditions apply:

- An EASA Form 1 is required for the installation if the antenna receives/transmits signals from/to equipment that can only be installed with an EASA Form 1.
- The antenna is installed in non-pressurised secondary structure areas, unless the location is set for this purpose in the airframe documentation or provided by the TC holder (i.e. NTO), or the antenna is being exchanged and has the same footprint.
- When holes are drilled on metallic or composite structures, or there is bonding of composite structures, the instructions defined by the aircraft manufacturer (e.g. repair manuals, AMM instructions), if available, take precedence over AC 43.13-2B, Chapters 1 and 3.
- The antenna is located at a distance from other antennas that is appropriate for the aircraft and the antennas.

**Note:** The following guidelines complement the manufacturer instructions. Ideally, for the 121.5-MHz ELT antenna, 2.5 metres is a sufficient separation from VHF communications and navigation receiving antennas to minimise unwanted interference. The 406-MHz ELT antenna should be positioned at least 0.8 metres from VHF communications and navigation receiving antennas to minimise interference<sup>11</sup>.

<sup>11</sup> Refer to the EASA Certification Memorandum EASA CM-AS-008 Issue 1 *Installation of ELTs* (<https://www.easa.europa.eu/document-library/product-certification-consultations/easa-cm-008>).

- The antenna is compatible with the connected equipment, ~~and is suitable for the environmental conditions to be expected during normal operation.~~
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- For aircraft certified to operate in known icing conditions, the new antenna is located at the same position and has a shape and a size similar to that of the existing antenna being replaced.
- The instructions and tests defined by the equipment manufacturer have to be followed.
- An installation check flight is conducted to confirm the functionality of the exchanged antenna ~~The performance of the new antenna installation or of the new antenna type has to be confirmed during testing~~ after installation (e.g. the range of the radio). This installation check flight is also expected to demonstrate that the newly installed or exchanged antenna does not disturb the proper functioning of any other installed systems. Installed systems include the required and non-required systems, as defined in the EASA Basic Regulation, e.g. required for the assessment of the type design, or by operating rules. Refer to CS STAN.48 in Subpart A for guidance.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

#### 5. Manuals

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the Pilot-owner.

## Standard Change CS-SC005<sup>ab</sup>

### INSTALLATION OF AN ADS-B OUT SYSTEM COMBINED WITH A TRANSPONDER SYSTEM

#### 1. Purpose

This SC is for the installation of **an ADS-B OUT systems combined with a transponder system**. This SC allows the embodiment of different configurations for the voluntary transmission of ADS-B data (e.g. **GNSSGPS** position and velocity). **The use of ADS-B portable units is not covered by CS-STAN.**

This SC addresses three cases:

- Configuration 1: an ADS-B OUT system that conforms to AMC 20-24<sup>12</sup>;
- Configuration 2: an ADS-B OUT system with ~~an ETSO-C199()~~ a GNSS position source **that is authorised in accordance with Class B ETSO-C199**;
- Configuration 3: an ADS-B OUT system with a GNSS position source that is not approved.

~~Note: The aircraft identified in the applicability/eligibility section of this SC do not need to comply with Commission Implementing Regulation (EU) No 1207/2011 or its later amendments. Consequently, they do not need to satisfy the requirements set by CS-ACNS Subpart D Section 4 '1090 MHz Extended Squitter ADS-B Out'.~~

The likelihood of erroneous data being transmitted to ADS-B ground stations and to other aircraft is defined by quality indicators.

- **A** Configuration 1 installation provides quality indicators according to the principles that are defined in AMC 20-24 while controlling the latency through a direct connection between the transponder and the GNSS position source.
- **A** Configuration 2 installation provides quality indicators that are defined in ETSO-C199.
- **A** Configuration 3 sets the quality indicators to zero (0). Operators of aeroplanes fitted with a ~~€~~Configuration 3 installation are expected to use the system for traffic awareness only. **ADS-B information sent from E** equipment emitting with quality indicators that are set to **zero (0)** might not be seen by other aircraft systems or by ATC.

#### 2. Applicability/Eligibility

This SC is applicable to:

- ~~— Aeroplanes that are not complex motor-powered aircraft, and that have a maximum cruising speed in ISA conditions below 250 kt TAS, rotorcraft that are not complex motor-powered aircraft, and to any ELA2 aircraft.~~
- **aeroplanes and rotorcraft that are not complex motor-powered aircraft provided that they do not have to comply with the ADS-B parts of the surveillance performance and interoperability (SPI) Regulation<sup>13</sup>;**
- **any ELA2 aircraft.**

<sup>12</sup> <https://www.easa.europa.eu/sites/default/files/dfu/Annex%20II%20-%20AMC%2020-24.pdf>

<sup>13</sup> Commission Implementing Regulation (EU) No 1207/2011 of 22 November 2011 laying down requirements for the performance and the interoperability of surveillance for the single European sky (OJ L 305, 23.11.2011, p. 35) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32011R1207&qid=1649844882936>).

Note: For the purpose of this SC, the SPI Regulation designates Regulation (EU) No 1207/2011 and all its subsequent amendments. Such amendments currently include Regulations (EU) No 1028/2014, (EU) 2017/386 and (EU) 2020/587.

### 3. Acceptable methods, techniques, and practices

The following standards contains acceptable data:

- FAA Advisory Circular AC 43.13-1B, Chapter 11 or ASTM F2639-18 or subsequent revisions; and
- FAA Advisory Circular AC 43.13-1B, Chapter 12.

This SC may be installed concurrently with CS-SC052().

Note: The referenced GNSS can already be installed on the aircraft; the characteristics of this GNSS receiver are used to configure the quality parameters accordingly (see subsequent instructions below). Alternatively, the GNSS receiver can be included in the transponder/ADS-B unit. Finally, the GNSS equipment can be installed in addition to this installation.

#### For Configuration 1:

The following conditions apply to Configuration 1:

- The transponder equipment and its installation are compliant with CS-SC002c or later amendments, or are otherwise approved.
- The ADS-B transmit unit (transponder) is approved authorised in accordance with ETSO-C166ab, or later revisions, or the equivalent standards.
- The GNSS installation is approved and the GNSS receiver is approved authorised in accordance with:
  - ETSO-C129a, or
  - ETSO-C196a or ETSO-C145c or ETSO-C146c,
 or later amendments, or the equivalent standards.
- The GNSS receiver is included in the transponder/ADS-B unit or is directly connected to the transponder/ADS-B unit.
- There is a direct digital interface between the GNSS receiver and the transponder, or the GNSS receiver is integrated into the transponder.
- The compatibility of the combination of the transponder and the GNSS receiver's for conformity with the AMC 20-24, including for latency, are is explicitly stated by the manufacturer of the transponder. Conformity with CS ACNS.D.ADSB, although not required, is also acceptable to replace conformity with AMC 20-24.
- The quality indicators are configured according to the principles specified in AMC 20-24. The SIL is typically a static (unchanging) value, and shall be set at the time of installation. The SIL is based solely on the probability of the position source exceeding the reported integrity value, and it shall be set to SIL = 3 for configuration 1. The ADS-B SDA parameter indicates the probability of an ADS-B system malfunction causing false or misleading position information or position quality metrics to be transmitted. The SDA shall be set to report SDA=2 for configuration 1. The SIL and SDA parameters shall be set as recommended

by the transponder manufacturer. Conformity with AMC 20-24 would typically be set to report SIL = 3 and SDA = 2 for Configuration 1.

- The correct transmission of the required parameters, identified in Section 7 of AMC 20-24, is verified during a ground test, which is performed in accordance with the instructions provided by the manufacturer of the transponder. The guidance of Appendix 1 to EASA SIB No 2011-15<sup>R2</sup> *Mode S and Mode C Transponder Systems: Ground Testing*<sup>14</sup> (latest revision) should be considered. The ground test shall also check that all the parameters transmitted for the extended squitter are consistent with the data transmitted for elementary surveillance.

**Note:** This check satisfies the requirement for periodical maintenance that is referred to in AMC 20-24, Section 11.

- The voluntary transmission of any additional parameters is verified to be correct through a ground test that is performed in accordance with the instructions provided by the manufacturer of the transponder.
- The installation instructions from the equipment manufacturer have to be followed.

#### For eConfiguration 2:

The following conditions apply to eConfiguration 2:

- The ADS-B transmitter forms part of the Mode S transponder equipment. The transponder equipment and its installation are compliant with CS-SC002c or later amendments, or are otherwise approved.
- ~~— The ADS-B transmit unit (transponder) is approved in accordance with ETSO-C166b, or later revisions, or the equivalent.~~
- The GNSS receiver is authorised approved and configured as a class B ETSO-C199 TABS device as part of this SC.
- The GNSS receiver is included in the transponder/ADS-B unit or is directly connected to the transponder/ADS-B unit.
- The transponder is configured to use a class B ETSO-C199 GNSS position source. ~~The GNSS receiver is configured as a class B ETSO-C199 TABS device (SIL=1), which is not compliant with any of the ETSOs defined in configuration 1 for the GNSS receiver.~~
- The installer shall set the quality indicators of the ADS-B extended squitter reports according to one of the following possibilities:
  - The ADS-B transmit unit (transponder) is authorised in accordance with ETSO-C166a or later revisions, or equivalent standards. The quality indicators are configured to report the quality indicators defined in ETSO-C199 in accordance with the instructions provided by the equipment manufacturer, typically with SDA = 1 and SIL = 1.
  - The transponder manufacturer declares that the ADS-B extended squitter reports meet the functional requirements and tests defined in ETSO-C166a or later revisions, or equivalent standards. The quality indicators are configured to report the quality indicators defined in ETSO-C199 in accordance with the instructions provided by the equipment manufacturer, typically with SDA ≤ 1 and SIL = 1.

<sup>14</sup> <https://ad.easa.europa.eu/ad/2011-15R2>

- The transponder manufacturer declares that the ADS-B extended squitter reports meet the functional requirements and tests defined in EUROCAE ED-102A/RTCA DO-260A with Corrigendum 1 or later revisions. The quality indicators are configured to report the quality indicators defined in ETSO-C199 in accordance with the instructions provided by the equipment manufacturer, typically  $SDA \leq 1$  and  $SIL = 1$ .
- When none of the above conditions applies, the quality indicators are configured to report the quality indicators defined in ETSO-C199 in accordance with the instructions provided by the equipment manufacturer, including  $SDA = 0$  and  $SIL = 1$ .

*Note:* In the context of this SC, the functional requirements are identical between EUROCAE ED-102A/RTCA DO-260B and EUROCAE ED-102A/RTCA DO-260B with Corrigendum 1. Corrigendum 1 corrects some errors and clarifies some requirements.

- ~~The compatibility of the combination of the transponder and the GNSS receiver is explicitly stated by the manufacturer of the transponder.~~ The installer follows the instructions from the manufacturer of the transponder to connect the GNSS source.
- ~~The quality indicators are configured to report the quality indicators defined in ETSO-C199 (e.g.  $SDA=1$  and  $SIL=1$ ) in accordance with the instructions provided by the equipment manufacturer.~~
- A ground test verifies the correct transmission of the quality indicators. Such a ground test is performed in accordance with the instructions provided by the manufacturer of the transponder. The ground test shall include transmitted ADS-B data and ELS (elementary surveillance) data. The ground test must also check that all the parameters transmitted for the extended squitter are consistent with the data transmitted for elementary surveillance.
- The installation instructions from the equipment manufacturer have to be followed.

### For eConfiguration 3:

The following conditions apply to eConfiguration 3:

- The ADS-B transmitter forms part of the Mode S transponder equipment. The transponder equipment and its installation are compliant with CS-SC002c or later amendments, or are otherwise approved.
- ~~The ADS-B transmit unit (transponder) is approved in accordance with ETSO-C166b, or later revisions, or the equivalent.~~
- The GNSS receiver is not authorised approved or its installation is not certified. ~~However, the compatibility of the combination of the transponder and the GNSS receiver is explicitly stated by the manufacturer of the transponder.~~ Nevertheless, the installer follows the instructions from the manufacturer of the transponder to connect the GNSS source.
- The antenna for the GNSS receiver and the GNSS receiver itself may be installed without an EASA Form 1.
- The quality indicators are configured according to the manufacturer instructions to report the lowest quality (e.g.  $SIL = 0$  and  $SDA = 0$ ,  $NACp = 0$ ).
- A ground test verifies the correct transmission of the quality indicators. Such a ground test is performed in accordance with the instructions provided by the manufacturer of the transponder. The ground test shall include transmitted ADS-B data and ELS (elementary surveillance) data. The ground test must also check that all the parameters transmitted for the extended squitter are consistent with the data transmitted for elementary surveillance.

- The installation instructions from the equipment manufacturer have to be followed.

#### For all configurations:

The installation configuration shall be recorded, or referred to, within in EASA Form 123.

*Note:* The values of the quality indicators are consistent with the equivalent combinations described in FAA AC 20-165B.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

An installation according to this SC cannot be used to claim compliance with CS-ACNS, Subpart D, Section 4 '1090 MHz Extended Squitter ADS-B Out installations'.

This SC only includes units that the manufacturer has declared as 'transponder-based 1090ES ADS-B' (refer to the definition in CS STAN.80 in Subpart A). This SC excludes 'transmission devices that are not Mode S transponder-based systems' (refer to the definition in CS STAN.80 in Subpart A).

In the case of aircraft that are approved for NVISs/NVGs, ~~if control/display panels are to be inserted,~~ the change cannot be considered ~~to be an~~ SC.

#### 5. Manuals

##### For eConfiguration 1:

Amend the AFM with an AFMS to include a statement of compliance with AMC 20-24, as well as any necessary operating instructions, procedures or limitations. Reference to CS ACNS.D.ADSB might be included, if applicable.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required by the equipment manufacturer. ~~In particular, include a check with content that is similar to the provisions of the latest revision of EASA SIB No.: 2011-15:~~

- ~~— at intervals defined and published by the competent authority, or~~
- ~~— at intervals defined in the latest revision of EASA SIB No.: 2011-15.~~

~~The ground test shall also include voluntarily transmitted ADS-B data (if any). This check satisfies the requirement for periodical maintenance that is referred to in AMC 20-24, Section 11.~~

##### For eConfiguration 2:

Amend the AFM with an AFMS to include information on the quality indicators, as well as any necessary operating instructions, procedures or limitations. Such limitations shall include information stating 'ADS-B OUT installation for airborne traffic awareness only' or similar information.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required by the equipment manufacturer. ~~In particular, include a check with content that is similar to the provisions of the latest revision of EASA SIB No.: 2011-15 provides background information.:~~

- ~~— at intervals that are defined and published by the competent authority, or~~
- ~~— at intervals that are defined in the latest revision of EASA SIB No.: 2011-15.~~

~~The ground test shall also include voluntarily transmitted ADS-B data (if any).~~

**For eConfiguration 3:**

Amend the AFM with an AFMS to include information stating 'ADS-B OUT installation for airborne traffic awareness only' or similar information, together with any necessary operating instructions, procedures or limitations.

**6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC006a

### EXCHANGE OF A COM, NAV OR NAV/COM UNIT FOR A COMBINED VHF VOICE COMMUNICATION AND NAVIGATION (NAV/COM) UNIT

#### 1. Purpose

This SC enables the exchange of any COM, NAV or NAV/COM unit for a combined NAV/COM unit.

Installers may take advantage of this SC to benefit from any ‘additional’ functions that are included in the NAV/COM unit, such as, for example, a built-in course deviation indicator (CDI).

This SC incorporates any type or combinations of NAV functions. This SC also includes any external ‘additional’ function that the manufacturer of the NAV/COM unit declares as compatible.

This SC does not include the installation of antennas (see CS-SC004a, which may be applied concurrently).

*Note 1:* The purpose of the NAV (navigation) function is for awareness only.

*Note 2:* This SC excludes equipment installations that are already described in other specific SCs for a different purpose.

*Note 3:* ‘Additional functions’ means any functions that contribute to the consistent integration of several functions into the cockpit. In this context, an ‘additional’ function can be both a dedicated means to operate the NAV/COM unit or anything that can simplify NAV/COM operations. ‘Additional’ functions are not necessarily required by airworthiness or operational regulations.

#### 2. Applicability/Eligibility

Aeroplanes that are not complex motor-powered aircraft, and any ELA2 aircraft except VLR.

This SC only applies to VFR installations (including night VFR).

This SC covers the installation of equipment that is not already described in another specific SC.

Operational regulations and airspace requirements complement the airworthiness requirements. This SC only addresses the ‘airworthiness requirements’.

#### 3. Acceptable methods, techniques, and practices

*Note:* The ‘Acceptable methods, techniques, and practices’ section merges the requirements for the COM function, for the NAV function, and for their combination into a single NAV/COM system.

The following standard contains acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapter 2.

Additionally, the following conditions apply:

- The COM function is capable of a 8.33-kHz and 25-kHz channel spacing.
- For the COM function, if the existing antenna cable is compliant with M17/28-RG58 (or equivalent standards, as specified for low operating temperatures), it may be reused, but it is recommended that it should be replaced with a cable that is compliant with M17/128-RG400 (PTFE) or equivalent.
- The unit is authorised in accordance with any of the following technical standards: JT50-2C37d, JT50-2C37e, ETSO-2C37e, JT50-2C38d, JT50-2C38e, ETSO-2C38e or ETSO-2C169a, or later amendments, or equivalent standards.

- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- The manufacturer of the unit has declared that the installation of the NAV/COM unit is suitable for the type of aircraft intended to be modified by means of this SC and for the intended operations.
- The manufacturer of the unit has declared that the installation of the NAV/COM is compatible with the connections to the existing flight management/navigation systems, as applicable.
- The installer follows the instructions from the manufacturer of the unit.
- The installer verifies that the power consumption is compatible with the aircraft installation. The results of the electrical-load analysis are recorded, or referred to, in EASA Form 123.
- An installation check flight confirms that the transmission and reception of the COM function are adequate. The proper functioning of the NAV functions is also checked as per the manufacturer instructions. Refer to CS STAN.48 in Subpart A for guidance.

#### **4. Limitations**

Any limitations defined by the equipment manufacturer apply.

In the case of aircraft approved for NVISs/NVGs, the change cannot be considered a SC.

*Note:* This SC does not apply to a complete conversion from a traditional cockpit to a glass cockpit, or vice versa. In this SC, a glass cockpit is to be interpreted as highly integrated and computerised display. In this context, following installation of this SC, the COM function shall continue to be easily accessible.

In accordance with CS STAN.20 in Subpart A, the installation of the equipment does not extend the operational capability of a specific aircraft: this SC cannot install a new item of equipment required to comply with an operational capability that did not already exist in the AFM.

This SC cannot be used to exchange units capable of receiving data link services from ATS.

This SC cannot be used to install a combined unit that includes a flight management system (FMS).

#### **5. Manuals**

Amend the AFM with an AFMS to include information stating 'NAV information to be used for situational awareness only' or similar information, together with any necessary operating instructions, procedures or limitations.

*Note:* No new capabilities are introduced by this SC.

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

#### **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC031~~b~~<sup>c</sup>

### EXCHANGE OF CONVENTIONAL ANTI-COLLISION LIGHTS, POSITION LIGHTS, ~~AND~~ LANDING ~~AND~~ TAXI LIGHTS ~~BY~~ FOR LED~~;~~ TYPE LIGHTS

#### 1. Purpose

Exchange of anti-collision lights, position lights, and landing and taxi lights by LED-type lights.

#### 2. Applicability/Eligibility

Aeroplanes that are not being complex motor-powered aircraft, rotorcraft that are not being complex motor-powered aircraft and are not approved for NVIS, and any other ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapter 4; and
- FAA Advisory Circular AC 43.13-1B, Chapter 11, Section 15 (on bonding) or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- taxi and landing lights that are not combined with anti-collision lights or with position lights are eligible for installation without an EASA Form 1;
- anti-collision lights and position lights for day VFR aircraft are eligible for installation without an EASA Form 1;
- anti-collision lights are authorised in accordance with ETSO-C96a or later amendments, or equivalent standards; Class III anti-collision lights (as defined in the technical standard referenced in ETSO-C96a or ETSO-C96b) can only be installed on aircraft certified with a certification basis prior to Part-23 Amendment 11; nevertheless, these lights do not need to be ETSO articles when installed on aircraft for operation under day VFR rules only;
- position lights are authorised in accordance with ETSO-C30c or later amendments, or equivalent standards, unless the aircraft is for day VFR operations only;
- the equipment is installed at in the same location with identical light distribution angles, comparable intensity distribution patterns, and similar colours;
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- the instructions and tests defined by the equipment manufacturer have to be followed; and
- any modification of the electrical wiring is performed in accordance with acceptable practices such as the aircraft maintenance manual (AMM) or Chapter 11 of FAA Advisory Circulars AC 43.13-1B or ASTM F2639-18 or subsequent revisions, and Chapter 4 of AC 43.13-2B.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

## 5. Manuals

If needed, amend the AFM with an AFMS that contains the equipment instructions for operation, as required. Amend the ICAs to establish maintenance actions/inspections and intervals, as required. In particular, consider describing the ~~description of~~ required maintenance actions after failures of single LED segments.

## 6. Release to service

~~This SC is not suitable for release to service of the aircraft by the Pilot-owner.~~ If no changes to the wiring or to the airframe structure are performed, this SC is suitable for the release of the aircraft by the pilot-owner. Changes to the electrical system beyond exchanging light bulbs and changes to the airframe structure are not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC032<sup>ab</sup>

### INSTALLATION OF ANTI-COLLISION LIGHTS

#### 1. Purpose

This SC ~~covers~~ enables the installation of anti-collision lights on the wing tips, the vertical tail tip and/or the fuselage for aircraft not originally certified with anti-collision lights.

~~Exchange of anti-collision lights is covered by CS-SC031.~~

#### 2. Applicability/Eligibility

Sailplanes, including powered sailplanes and ELA2 aeroplanes that have been certified as VFR and were not originally certified with anti-collision lights (this includes LSA, VLA and FAR 23 prior to Amendment 23-49 ~~airplanes~~ aeroplanes).

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-1B and AC 43.13-2B, Chapter 1 and 4;
- FAA Advisory Circular AC 43.13-1B Chapter 11 or ASTM F2639-18 or subsequent revisions; and
- FAA Advisory Circular AC 20-30B.

Additionally, the following conditions apply:

- anti-collision lights are eligible for installation without an EASA Form 1;

**Note:** The installer should select equipment with similar operational objectives to those defined in ETSO-C96a or later amendments, or equivalent standards. The installation of equipment with operational objectives similar to Class III anti-collision lights (as defined in the technical standard referenced in ETSO-C96a or ETSO-C96b) should be avoided. ~~The equipment is authorised in accordance with ETSO-C96a or later amendments, or equivalent;~~

- the anti-collision light is located in at a distance to from other systems that is appropriate for the aircraft and the anti-collision light;
- the anti-collision light is compatible with the connected equipment; ~~and is suitable for the environmental conditions to be expected during normal operation;~~
- the anti-collision light is suitable for the environmental conditions to be expected during normal operation; refer to CS STAN.42 in Subpart A for guidance;
- the impact on weight and balance needs to be considered;
- the instructions and tests defined by the equipment manufacturer have to be followed and recorded; and
- Any modification of the electrical wiring is performed in accordance with acceptable practices such as the aircraft maintenance manual (AMM), or Chapter 11 of FAA Advisory Circular AC 43.13-1B, or ASTM F2639-18 or subsequent revisions.

Depending on the installation position, the following paragraphs also apply:

### 3.1 Anti-collision lights installed on the wing tips and/or the vertical tail tip

Anti-collision lights may be installed if their total weight, including reinforcements, is less than or equal or lower than to the weight of a certified installation of anti-collision lights installation on a similar aircraft. Similarity shall be assessed following the guidelines given by AC 23.629-1B, Chapter 1, paragraph 1c. The location of the anti-collision lights shall be similar to the location on equivalent aircraft. This assessment shall be recorded, or referred to, within EASA Form 123.

The installation of Anti-collision lights installation shall not alter the torsional stiffness.

### 3.2 Anti-collision lights installed on the fuselage

The anti-collision light is installed in non-pressurised secondary structure areas, unless the location is set for this purpose in the airframe documentation or provided by the TC holder (i.e. NTO), or the anti-collision light is being installed on an existing provision with the same footprint.

## 4. Limitations

- Any limitation defined by the equipment manufacturer applies.
- The installation of anti-collision lights on control surfaces is not permitted.
- Only installation is only allowed on wings without any sweep angle is allowed.
- Installation of anti-collision lights in wings with aspect ratio above 7 is not permitted.
- The maximum mass for an installation of anti-collision lights on wings with aspect ratios below 7 is 500 g each.
- The maximum mass for an installation of anti-collision lights on wings with aspect ratios above 7 is 300 g each.

## 5. Manuals

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

## 6. Release to service

This SC is not suitable for the release to service of the aircraft by the Pilot-owner.

## Standard Change CS-SC033<sup>ab</sup>

### INSTALLATION OF CABIN AND COCKPIT CONVENTIONAL LIGHTS ~~BY~~ **FOR** LED-TYPE LIGHTS

#### 1. Purpose

The installation or exchange of cabin and cockpit conventional lights ~~by~~ **for** LED-type lights. The installation of new warning, caution, or advisory lights is not covered by this ~~SC~~ **Standard Change**.

#### 2. Applicability/Eligibility

Aeroplanes **that are** not ~~being~~ complex motor-powered aircraft, rotorcraft **that are** not ~~being~~ complex motor-powered aircraft and not approved for NVIS, and any other ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contains acceptable data:

- FAA Advisory Circular AC 43.13-1B, Chapter 11 **or ASTM F2639-18 or subsequent revisions.**

Additionally, the following **conditions** apply**ies**:

- **the LED-type cabin/cockpit lights covered by this SC are eligible for installation without an EASA Form 1;**
- any installation or exchange of lights shall not interfere **with** or degrade the existing emergency ~~lights~~ **lighting** system;
- in cases of exchanges of conventional lights ~~by~~ **for** LED-type lights, the equipment should be installed ~~at~~ **in** the same location and with identical light distribution angles and colours, or at least:
  - the new LED-type lights shall provide adequate lighting without introducing **any** glare and/or reflections that could distract the flight crew or interfere with **flight** crew vision; and
  - ~~for any~~ lights exchanged in the cockpit:
    - ~~if warning, caution, or advisory lights are exchanged they~~ must be **of the same colours as those that are replaced;**
      - ~~— red, for warning lights (lights indicating a hazard which may require immediate corrective action);~~
      - ~~— amber, for caution lights (lights indicating the possible need for future corrective action); and~~
      - ~~— green, for safe-operation lights.~~
    - ~~any other light exchanged in the cockpit must be of any other colour, including white, provided that the colour differs sufficiently from the colours used for warnings, cautions, and advisories to avoid possible confusion;~~
- in cases of installation of LED-type lights:
  - they shall provide adequate lighting without introducing **any** glare and/or reflections that could distract the flight crew or interfere with **flight** crew vision; and
  - if they are installed in the cockpit, they can be of any colour, provided the colours ~~differs~~ **differ**s sufficiently from the colours used for warnings, cautions, and advisories, ~~to avoid possible confusion;~~

- The equipment is ~~qualified~~ suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- the instructions and tests defined by the equipment manufacturer have to be followed; and
- any modification of the electrical wiring is performed in accordance with acceptable practices such as the aircraft maintenance manual (AMM) ~~AFM~~, or FAA Advisory Circular AC 43.13-1B, Chapter 11 or ASTM F2639-18 or subsequent revisions.

#### 4. Limitations

Any limitation defined by the equipment manufacturer applies.

#### 5. Manuals

If needed, amend the AFM with an AFMS that contains the equipment instructions for operation, as required. Amend the ICAs to establish maintenance actions/inspections and intervals, as required. In particular, consider describing the ~~description of~~ required maintenance actions after a failure of a single LED segment.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the Pilot-owner.

## Standard Change CS-SC034<sup>bc</sup>

### EXCHANGE OF AN EXISTING BATTERY FOR A LITHIUM IRON PHOSPHATE (LiFePO<sub>4</sub>) BATTERY SYSTEM

#### 1. Purpose

This SC is for the exchange of an existing battery for LiFePO<sub>4</sub>-type battery systems in aircraft.

This SC does not cover nor replace the applicable regulations for the handling, storage, transport, or disposal of batteries.

*Note:* This SC does not cover the installation of a battery in a new location.

#### 2. Applicability/Eligibility

This SC is applicable to sailplanes, including powered sailplanes.

#### 3. Acceptable methods, techniques, and practices

- Before installation, a statement has to be available to ensure that the battery systems, batteries or the battery cells are compliant at least with one of the following standards:
  - RTCA DO-347, Certification Test Guidance for Small and Medium Sized Rechargeable Lithium Batteries and Battery Systems; or
  - RTCA DO-311A, Minimum Operational Performance Standards for Rechargeable Lithium Batteries and Battery Systems; or
  - UL 1642, Standard for Lithium Batteries, or ~~the~~-equivalent standards; or
  - UL 2054, Standard for Household and Commercial Batteries, or ~~the~~-equivalent standards; or
  - UL 62133 Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes – Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made From Them, for Use in Portable Applications, or ~~the~~-equivalent standards; or
  - UL 1973 Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications, or ~~the~~-equivalent standards; or
  - IEC 62133-2 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications, Part 2: Lithium systems, or ~~the~~-equivalent standards.
- The battery systems, batteries or the battery cells are eligible for installation without an EASA Form 1.
- For installation purposes, FAA Advisory Circular AC 43.13-2B, ~~43-13-2B~~ Chapters 1 and 2, and FAA Advisory Circular AC 43.13-1B, Chapter 11, or ASTM F2639-18 or subsequent revisions contain acceptable data.
- Any impact on the weight and balance of the aircraft needs to be considered.
- It must be possible for the pilot to disconnect the battery from the electric system in flight.

*Note:* For example, a standard master battery switch commonly found in most aircraft is an acceptable means to disconnect the battery.

#### 4. Limitations

- Batteries that are used for propulsion are not covered.

- Starter batteries are not covered.
- The battery system shall have an integrated battery management system provided by the battery manufacturer.
- Each installed battery system shall have a maximum capacity of 160 Wh.
- Any limitation defined by the battery system manufacturer applies.

**5. Manuals**

Amend the ICAs to ~~establish~~ **introduce the required** maintenance actions/inspections and intervals, ~~as required~~.

**6. Release to service**

A release to service **of the aircraft** by the pilot-owner is acceptable only if the original battery mounting and connectors remain.

## Standard Change CS-SC035<sup>ab</sup>

### INSTALLATION OF SOLAR CELLS ON SAILPLANES

#### 1. Purpose

This SC is for the installation of solar cells on sailplanes for the purpose of allowing longer operation of the on-board battery system.

This SC does not cover solar cells that are used to recharge any batteries or energy storage systems for an electric propulsion system on a powered sailplane.

This SC does not cover the installation of batteries.

#### 2. Applicability/Eligibility

This SC is applicable to ELA1 sailplanes, including powered sailplanes.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data for installation purposes:

- FAA Advisory Circular AC 43.13-2B, ~~43-13-2B~~ Chapters 1 and 2; and
- FAA Advisory Circular AC 43.13-1B, Chapter 11 or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- The solar cells shall be located either in the area of the upper side of the fuselage between the tangential bolts that connect the wings to the fuselage, and/or on the doors of a retractable engine, ~~if applicable~~ or ~~as specified by the aircraft manufacturer~~. Typically, the solar cells are bonded to the surface with self-adhesive tape as described/specified by the solar cell manufacturer.
- Any holes that are required to route cables from the solar cells into the inner parts of the fuselage should not be larger than 6 mm in diameter, and special attention is required to prevent any chafing or ~~short circuit~~~~short-cuts~~ in these feedthroughs. If several holes are required for these feedthroughs, then ~~these shall not be closer than 30 mm from each other and~~ the number of holes should be minimised.
- Special care is required to avoid damaging any bulkheads or stringers on the inside of the fuselage structure when drilling these holes.
- Seal any hole in the skin and in the solar panel to prevent any moisture penetration beneath the solar panels.
- The distance between the new holes and the cut-outs or other edges should comply with the aircraft manufacturer's guidance. In the absence of such guidance, a minimum of 100 mm should be considered.
- The electrical connections to the storage battery(ies) shall be installed according to the instructions of the ~~manufacturer of the~~ solar cell charging system ~~manufacturer~~, and shall:
  - include a battery charge controller, to prevent overcharging of the storage battery(ies). If a lithium battery(ies) is (are) ~~(or lithium batteries are)~~ installed, a battery management system is required;
  - provide circuit protection (e.g. circuit breakers) against system overloads, and against smoke and fire hazards that result from intentional or unintentional system shorts, faults, etc.; and

- provide a clearly labelled 'en/off-ON/OFF switch' for deactivating all the solar cells, which is easily accessible by the pilot-in-command when in flight. As an alternative, a clearly labelled switch-rated circuit breaker may be used to also provide the circuit protection.

*Note:* The use of circuit breakers as switches is not acceptable as it can degrade their protection function, except for switch-rated circuit breakers, provided that they are shown to be appropriately rated for the number of switch cycles that are expected during the service life of the system or of the circuit breakers.

- After installation, perform a test to ensure that the flight control systems can move freely.
- Before the first operation in flight, a functional test of the system needs to be conducted on the ground with special attention paid to any possible overcharging or overheating of the system.
- Any impact on the weight and balance of the aircraft needs to be considered.
- The instructions and tests defined by the equipment manufacturer shall be followed.

#### 4. Limitations

- If more than one battery will be charged at the same time, then all these batteries must have the same voltage and be of the same type and voltage (e.g. only lead-acid batteries running on 12 V).
- Any limitations defined by the solar cell and charging system manufacturer apply.
- Any limitations defined by the aircraft manufacturer apply (e.g. a limitation to install such solar cells onto a certain area on the surface of the sailplane).
- The installation of solar cells on structural parts such as the fuselage (i.e. not on the doors) is subject to the aircraft manufacturer not technically objecting (i.e. NTO) to this installation.
- ~~Solar cells must always be connected to the storage battery;~~ Direct power supply of power to flight instruments and ATC equipment solely by solar cells is not allowed.
- The maximum power of the solar cells installed by means of this SC cannot exceed 40 W.

#### 5. Manuals

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required (e.g. Normal, Abnormal and Emergency Procedures for solar cell system power off).

Amend the ICAs to establish the required actions regarding the maintenance/cleaning/caring actions for the solar cells and charging system, as required.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC036<sup>ab</sup>

### INSTALLATION OF VISUAL AWARENESS LIGHTS

#### 1. Purpose

This SC is for the installation of visual awareness lights that are not certified as anti-collision lights and are not required by operational ~~regulations~~ rules. These lights are typically high-intensity LEDs.

Due to their special~~ised~~ purpose of helping pilots to avoid mid-air collisions, such light systems often have a limited field of coverage in the forward sector of the aircraft and/or they do not comply with the requirements as specified in the ~~related certification specifications~~ ~~airworthiness requirements for aeroplanes~~ (e.g. in CS-23).

*Note:* For the installation of anti-collision lights, refer to CS-SC032<sup>(j)</sup>.

#### 2. Applicability/Eligibility

This SC is applicable to ~~any~~ ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data for installation purposes:

- FAA Advisory Circular ~~AC 43.13-2B~~, ~~43-13-2B~~ Chapters 1 and 2 ~~are acceptable~~; and
- FAA Advisory Circular AC 43.13-1B, Chapter 11 ~~or ASTM F2639-18 or subsequent revisions; and~~
- ~~ASTM F2490-20 or subsequent revisions (for electrical-load analysis)~~.

Additionally, the following conditions apply:

- ~~Visual awareness lights are eligible for installation without an EASA Form 1.~~
- Any impact on the weight and balance of the aircraft needs to be considered.
- For sailplanes, the visual awareness light systems shall be installed in one or more of the following locations:
  - in the area of the upper/lower side of the fuselage between the tangential bolts that connect the wings to the fuselage;
  - on the doors of a retractable engine;
  - on the doors of the landing gear;
  - on the nose of the aircraft;
  - on the outer side of the wing tips;
  - on the empennage;
  - on top of the instrument panel;
  - in the inside of the forward part of the canopy.
- For other aircraft, consider the conventional airframe locations for these lights.

- Typical installations are streamlined shapes that are mounted on the upper/lower side of the fuselage, the aircraft nose or wing tips, and devices that are installed on the inside of the canopy facing forward with provisions to not blind the pilot with the emitted light.
- For aircraft that only have storage batteries, the visual awareness light systems must be suitable for the voltage, power and type of these batteries.
- ~~For aircraft with conventional power systems, an~~ An electrical load analysis has to be considered.
- Any holes that are required to mount the visual awareness light and the related route cables into the inner parts of the fuselage must not be larger than 6 mm in diameter. Special attention is required to prevent any chafing or ~~short circuit~~ short-cuts in these feedthroughs.
- If several holes are required for these feedthroughs, then these shall not be closer than 30 mm from each other, and the number of holes must be minimised.
- Special care is required to avoid damaging any bulkheads or stringers on the inside of the fuselage structure when drilling these holes.
- Follow the instructions of the visual awareness light manufacturer. Special care is required to prevent any possibility that the operating visual awareness light might blind the pilot or that the visual awareness light might hinder the forward vision of the pilot or any other aircrew on board, including reflections from the canopy/front windshield.

The design of the equipment installation must take into account crashworthiness, the arrangement and visibility of the installation, and any interference with other equipment.

Additionally, if the system is mounted ~~in~~ on the inner side of the canopy or on the instrument panel, the design of the equipment installation must take into account the ~~jettison of the~~ canopy ~~jettison~~ and the emergency exit.

- The electrical connection to the storage battery(ies) shall be installed according to the instructions of the visual awareness light system manufacturer, and shall ~~provide~~:
  - ~~provide~~ circuit protection (e.g. circuit breakers) against system overloads, smoke and fire hazards that result from intentional or unintentional system shorts, faults, etc.; and
  - ~~provide~~ a clearly labelled 'on/off ON/OFF switch' for deactivating all visual awareness lights, ~~which that~~ is easily accessible by the pilot-in-command in flight. As an alternative, a clearly labelled switch-rated circuit breaker may be used to also provide circuit protection.

*Note:* The use of circuit breakers as switches is not acceptable, as it can degrade their protection function, except for a switch-rated circuit breaker, provided that it is shown to be appropriately rated for the number of switch cycles that are expected during the service life of the system or of the circuit breaker.

- Before the first operation in flight, a functional test of the system has to be conducted on the ground with special attention to the possible blinding of the pilot or the overheating of the system.
- ~~The i~~nstructions and tests defined by the equipment manufacturer shall be followed.
- For aircraft that are not limited to ~~operate in~~ day VFR conditions, a placard shall be installed to limit the use of visual awareness lights to day VFR conditions only.

#### 4. Limitations

- Visual awareness lights should be operated in day VFR conditions only and for situational awareness only.

- Any limitations defined by the visual awareness light system manufacturer apply.
- Any limitations defined by the aircraft manufacturer apply (e.g. a limitation to only install such a visual awareness light on a certain area on the surface of the aircraft).
- This SC does not cover visual awareness light systems that require any modifications to parts of the wings (except wing tips) or to the empennage of the aircraft.
- The maximum number of visual awareness lights installed on each wing and on the empennage is one on each.

## **5. Manuals**

The AFMS shall, at least, contain:

- a description of the system, its operating modes and functionality;
- limitations, warnings and placards, as required; and
- the normal and emergency operating procedures.

Amend the ICAs to establish the required actions regarding the maintenance/cleaning/caring actions for the visual awareness light system, as required.

## **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC037<sup>a</sup><sub>b</sub>

### EXCHANGE OF A MAIN AIRCRAFT BATTERY

#### 1. Purpose

This SC is for the exchange of a main aircraft battery (e.g. <sup>a</sup> starter battery, batteries for sailplanes) for another type that meets the same minimum standards.

This SC does not cover the installation of lithium batteries.

This SC does not cover the installation of a battery in a new location.

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes and to rotorcraft that are not complex motor-powered aircraft, and to any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standard contains acceptable data for installation purposes:

- FAA Advisory Circular AC 43.13-2B, ~~43-13-2B~~ Chapters 1, 2 and 10 or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- An acceptable standard for the battery or the test of the battery cells (performed and stated by the battery manufacturer) is:
  - ETSO-C173A or later amendments, or ~~the~~ equivalent standards.
- Any impact on the weight and balance of the aircraft shall be considered.
- The new battery shall:
  - feature a maximum power that is greater than or equal to the power of the replaced battery; and
  - have a capacity that is greater than or equal to the capacity of the replaced battery.

#### 4. Limitations

- Any limitations defined by the battery manufacturer apply.
- The regulations for the handling, storage, transport, and disposal of batteries apply.
- Batteries that are used for propulsion are not covered.
- Backup batteries that support essential systems such as avionics, or that are used for IFR operations, are not covered by this SC.

#### 5. Manuals

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC038<sup>ab</sup>

### INSTALLATION OF DC-TO-DC CONVERTERS

#### 1. Purpose

This SC is for installations of DC-to-DC converters to support avionics installations, equipment that requires a power supply with a controlled voltage, and pilot devices.

This SC cannot be used where the converter is intended to power the following:

- aircraft systems that are necessary for continued safe flight and landing; or
- aircraft systems that are required within the airspace to which the Standardised European Rules of the Air (SERA) apply ~~to comply with airspace regulations.~~

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes and to rotorcraft that are not complex motor-powered aircraft, and to any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, ~~43-13-2B~~ Chapters 1 and 2, ~~and~~
- FAA Advisory Circular AC 43.13-1B, Chapter 11 or ASTM F2639-18 or subsequent revisions; and
- ASTM F2490-20 or subsequent revisions (for electrical-load analysis).

Additionally, the following conditions apply:

- ~~— The DC to DC converters are authorised in accordance with ETSO-C71 or later amendments, or the equivalent.~~
- The equipment manufacturer has declared that the DC-to-DC converter complies with European standards<sup>15</sup>, or equivalent standards, as applicable for fixed installations. When the DC-to-DC converter bears a CE marking, the installer does not need to check the declaration of compliance.
- The installer checks that the DC-to-DC converter to be installed is not listed in the rapid alert system for dangerous non-food products<sup>16</sup>.
- The product name, type/number of model and pertinent information that can be subsequently used to check safety alerts, if necessary, are recorded, or referred to, in EASA Form 123.
- DC-to-DC converters are eligible for installation without an EASA Form 1.
- The installation of ~~the~~ DC-to-DC converters shall be protected by circuit protection (e.g. circuit breakers) against system overloads, smoke and fire hazards that result from intentional or unintentional system shorts, faults, etc. The design of the equipment installation must take into account crashworthiness, the arrangement of the installation and any interference with other equipment.

<sup>15</sup> [https://ec.europa.eu/growth/single-market/european-standards\\_en](https://ec.europa.eu/growth/single-market/european-standards_en)

<sup>16</sup> See for example [https://ec.europa.eu/consumers/consumers\\_safety/safety\\_products/rapex/alerts/?event=main.listNotifications&year=2020&lng=en](https://ec.europa.eu/consumers/consumers_safety/safety_products/rapex/alerts/?event=main.listNotifications&year=2020&lng=en).

- The design of the equipment installation must take into account the structural integrity of the instrument panel or any other attachment point. Special consideration is necessary for equipment that is installed in a location behind the occupant(s).
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- The installation instructions and tests defined by the equipment manufacturer have to be followed.
- If multiple busbars are available, the DC-to-DC converter should be connected to the busbar that supports the criticality ~~which~~ that is appropriate to the equipment that the converter supplies with power.
- If there are systems or equipment that are/is supplied by an essential power supply, i.e. systems or equipment that are/is necessary for continued safe flight and landing, an electrical load analysis or electrical measurements shall be undertaken. This analysis or measurement shall take into account the maximum loading that may be utilised from the PSS for the PED to substantiate that the aeroplane's electrical power generating system has sufficient capacity to safely provide the maximum amount of power required by the PSS for the PED. This assessment shall be recorded, or referred to, in EASA Form 123.
- Perform an EMI test to assess any interference ~~of~~ from the converter with other systems.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

#### 5. Manuals

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

Amend the AFM with instructions for operation, as required.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC051<sup>ed</sup>

### INSTALLATION OF 'FLARM' EQUIPMENT

*Note:* Originally, FLARM<sup>®</sup> equipment was developed for sailplanes, but nowadays, such devices are more and more being installed in other light aircraft as well. ~~While FLARM<sup>®</sup> devices are considered to be Standard Parts in the case of sailplanes, 21.A.307(c) may allow their installation without Form 1.~~ FLARM<sup>®</sup> is an internationally registered trademark. For the purpose of this SC, the term 'FLARM' is also used to describe the functionality.

#### 1. Purpose

This SC is for the installation or exchange of FLARM<sup>®</sup> systems that provide situational awareness information on traffic, or traffic and obstacles ~~awareness and collision avoidance systems~~. These systems are based on the specifications as defined by FLARM<sup>®</sup> Technology Ltd. Such products include all devices that embed FLARM technology.

*Note:* FLARM equipment is not equivalent to Transponder Mode A/C/S, ADS-B, Class A TABS or TCAS/ACAS equipment.

An aircraft that has only FLARM equipment installed will not be seen by air traffic control (ATC) or by ACAS/TCAS systems.

The installation of additional batteries is not covered by this SC.

This SC does not cover the installation of external antennas (see CS-SC004<sup>()</sup>, which may be applied concurrently).

#### 2. Applicability/Eligibility

This SC is applicable to:

- aeroplanes that are not complex motor-powered aircraft;
- rotorcraft that meet all the following conditions:
  - have a MTOM of 3 175 kg or less;
  - are certified for a maximum passenger seating configuration of 9 passengers or fewer;
  - are not approved for Category A (CAT A), or equivalent to CAT A, operations;
- ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, ~~43-13-2B~~ Chapters 1, ~~and-2~~ and 11; and
- FAA Advisory Circular AC 43.13-1B, Chapter 11 or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.
- The design of the equipment installation must take into account crashworthiness, the arrangement of the installation and its visibility, interference with other equipment, the jettison of the canopy ~~jettison~~ and the emergency exit.

- The design of the equipment installation must take into account the structural integrity of the instrument panel or any other attachment point. Special consideration is necessary for equipment ~~that is~~ installed in a location behind the occupant(s).
- The installation should allow the pilot to isolate the FLARM unit in flight from the aircraft's electrical system without interrupting the power supply to other essential avionics.
- Data bus/data connectivity between the FLARM device and other equipment which is:
  - ETSO-~~authorized~~ (or ~~the equivalent~~ **authorisation**); or
  - required by the TCDS, AFM or POH; or
  - required by other applicable requirements such as those for operations and airspace,
 is not allowed unless the FLARM device is explicitly **recognised by the manufacturer of the other equipment** ~~listed by its manufacturer~~ as compatible equipment to which the other equipment can be connected.

**Note:** The recognition of FLARM by the equipment manufacturer has to address overall compatibility and digital communication interfaces and information security protection aspects, if the latter is applicable.

- The equipment is qualified suitable for the environmental conditions to be expected during normal **operations**; see CS STAN.42 in Subpart A for **guidance**.
  - **Installation and maintenance follow the instructions provided by the manufacturer.**
- Note:** FLARM® Technology Ltd has published generic instructions for continuing airworthiness (refer to **FTD-073**). ~~Instructions and tests defined by the equipment manufacturer have to be followed.~~
- **An installation check flight is conducted** ~~Fly the aircraft~~ to assess the installation for satisfactory antenna coverage and identify any possible limitations, by analysing data from the built-in flight recorder with the 'FLARM Range Analyzer' tool of FLARM® Technology Ltd (available at [www.flarm.com](http://www.flarm.com)). **Additionally, for installation on rotorcraft, this installation check flight should also verify that the installation of the FLARM device does not cause excessive vibrations. Refer to CS STAN.48 in Subpart A for guidance.**

~~*Note: The above mentioned flight is considered to be part of the SC installation activity, and it can be conducted without an individual Permit to Fly or any other certificate of release to service for the SC installation, as long as there is no other maintenance activity ongoing on the aircraft (i.e. other maintenance, which has not yet been released to service). The flight should be conducted by a pilot who understands the aircraft configuration (i.e. for an FLARM installation that has not yet been released to service). EASA Form 123 and the certificate of release to service for the installation of the SC should be issued after the result provided by the FLARM range analyzer tool has been assessed and found to be satisfactory.*~~

#### 4. Limitations

The FLARM®-based system cannot be used to substitute for any anti-collision device that is mandated by the EU **AIR OPS** rules for the intended operation.

In the case of aircraft that are approved for NVIS/NVGs, ~~if control/display panels are to be inserted~~, the change cannot be considered ~~to be~~ a SC.

Any limitations defined by the manufacturer of the FLARM<sup>®</sup> device are applicable. These must include periodical firmware and database updates as defined in the Instructions for Continuing Airworthiness (ICAs). ~~firmware and such database updates that are necessary for the intended function of the device.~~

Alerts generated by other rotorcraft systems, which need more immediate action, shall prevail over any alerts generated by FLARM installations.

The use of FLARM is limited to prompting additional crew actions in accordance with the rules of the air to try to acquire a visual contact with surrounding traffic and/or obstacles.

The information provided by FLARM shall not be displayed by an instrument that is used to provide information that is required by airworthiness or operational rules.

## 5. Manuals

Amend the AFM with an ~~The~~ AFMS to include ~~shall~~, at least, the following ~~contain~~:

- a description of the system, its operating modes and its functionality, and information about interoperable systems;
- limitations, warnings and placards, at least, for the following:
  - ‘For situational awareness only’,
  - ‘Use in day VFR only’ for aircraft which are approved for operations beyond day VFR;
- the normal and emergency operating procedures; and
- instructions for carrying out software and database updates.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

**Note:** FLARM<sup>®</sup> Technology Ltd has published instructions for continuing airworthiness in document FTD-073 ‘INSTRUCTIONS FOR CONTINUED AIRWORTHINESS’.

## 6. Release to service

The first installation of this ~~This~~ SC is not suitable for the release to service of the aircraft by the pilot-owner.

The pilot-owner may exchange an already installed FLARM unit for another FLARM unit under the following conditions:

- the new FLARM unit is installed in the same location;
- the new FLARM unit is identical to the exchanged unit, or the installation instructions from FLARM<sup>®</sup> Technology Ltd foresee the possibility of an exchange of one FLARM unit for another with the same form and fit.

## Standard Change CS-SC052<sup>ed</sup>

### INSTALLATION OF GNSS EQUIPMENT

#### 1. Purpose

This SC is for the installation of GNSS equipment to enhance situational and/or airborne traffic awareness. This could also include ~~moving map~~ GNSS-based ~~moving map~~ functions.

This SC does not include the installation of external antennas (see CS-SC004(), which may be applied concurrently).

For ~~integrated systems~~ installations that also provide voice communications functionality and/or ~~VOR~~ navigation capability, CS-SC052() may be applied concurrently with CS-SC001(), and/or CS-SC006() and/or CS-SC056().

CS-SC052() may be applied concurrently with CS-SC005() and/or CS-SC057(). In such cases, the position information delivered by the GNSS equipment shall implement the respective requirements from CS-SC005() and/or CS-SC057() for the GNSS equipment.

Furthermore, ~~this SC does also not cover the connection of the GNSS equipment to any kind of AFCS or to a required system, as defined in the EASA Basic Regulation, e.g. required for the assessment of the type design, or by operating rules, nor to an ADS-B OUT system.~~

#### 2. Applicability/Eligibility

~~This SC is applicable to aeroplanes and to rotorcraft that are not complex motor-powered aircraft, and to any ELA2.~~

This SC is applicable to:

- aeroplanes that are not complex motor-powered aircraft;
- rotorcraft that meet all the following conditions:
  - have a MTOM of 3 175 kg or less;
  - are certified for a maximum passenger seating configuration of 9 passengers or fewer;
  - are not approved for Category A (CAT A), or equivalent to CAT A, operations;
- ELA2 aircraft.

This SC can be used to install or exchange an electronic conspicuity (EC) function or device in the following cases:

- VFR installations, including night VFR;
- exchange of an existing electronic conspicuity (EC) function or device on an IFR aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- ~~For VFR use only:~~ FAA Advisory Circular AC 20-138D, including Change 1 and Change 2, Appendix 6, with the exception of paragraphs A6-4.c and A6-4.f;
- FAA Advisory Circular AC 43.13-2B, ~~43-13-2B~~ Chapter 1 and 2; and
- FAA Advisory Circular AC 43.13-1B, Chapters 11 and 12 or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

— For the GNSS receiver:

- When used as a position source for Configurations 1 and 2 of CS-SC005(), the GNSS in this SC shall be installed with an EASA Form 1. When used as a position source for Configuration 3 of CS-SC005(), the GNSS in this SC is eligible for installation without an EASA Form 1. Additionally, all the conditions for the GNSS receiver in CS-SC005() apply. Finally, the GNSS manufacturer shall indicate compatibility for concurrent installation of the GNSS receiver with CS-SC005().
- When the GNSS in this SC is installed concurrently with CS-SC057(), all the conditions for 'aircraft position' contained in CS-SC057() apply. These conditions include provisions for the installation with or without an EASA Form 1. Additionally, the GNSS manufacturer shall indicate compatibility for concurrent installation of the GNSS receiver with CS-SC057().
- In all other cases, the GNSS in this SC is eligible for installation without an EASA Form 1.

— The design of the equipment installation must take into account crashworthiness, the arrangement and visibility of the installation, and it should not interfere with any other equipment, the jettison of the canopy ~~jettison- (if applicable)~~, or the emergency exit.

— Data connectivity ~~with~~ ~~between~~ the GNSS installed equipment and other equipment which is:

- required by the TCDS, AFM or POH;
- required by other applicable requirements such as those for operations and airspace; or
- mandated by the respective MEL, if this exists,

is not allowed unless the GNSS equipment that is being installed is explicitly listed by its manufacturer as compatible equipment to which the other equipment can be connected.

**Note:** The GNSS equipment manufacturer declares overall compatibility and digital communication interfaces. This includes compatibility for concurrent installation with CS-SC005() and/or CS-SC057(), if applicable.

— The equipment is suitable for the environmental conditions to be expected during normal operations; refer to CS STAN.42 in Subpart A for guidance.

— The instrument does not introduce any glare or reflections that could interfere with the pilot's vision. This condition applies to the instrument for all operations for which certification is requested.

— The equipment must be installed and tested in accordance with the equipment manufacturer's instructions.

#### 4. Limitations

— When this SC is installed concurrently with CS-SC005() and/or CS-SC057(), the respective limitations from Section 4 of CS-SC005() and/or CS-SC057() apply. When this SC is installed concurrently with CS-SC001() and/or CS-SC006() and/or CS-SC056(), the respective limitations from Section 4 of CS-SC001() and/or CS-SC006() and/or CS-SC056() apply. In other cases, the following limitation applies: ~~±~~ the system is to be used for situational awareness ~~under VFR~~ only.

— The installation of the equipment ~~installation~~ cannot be used to extend the operational capability of the specific aircraft (e.g. from VFR to IFR).

— All the relevant integrated databases (e.g. for charts) must be current.

- In the case of aircraft that are approved for NVISs/NVGs, ~~if control/display panels are to be inserted~~, the change cannot be considered ~~to be an~~ SC.
- Any limitations defined by the equipment manufacturer apply.

## 5. Manuals

The AFMS shall, at least, contain:

- a description of the system, its operating modes and its functionality;
- a ~~limitations~~ section that states the following:
  - instructions listed in Section 5 of CS-SC001() and/or CS-SC006() and/or CS-SC056() when this SC is installed concurrently with CS-SC001() and/or CS-SC006() and/or CS-SC056(); and/or
  - instructions listed in Section 5 of CS-SC005() and/or CS-SC057() when this SC is installed concurrently with CS-SC005() and/or CS-SC057(); or
  - in other cases, a limitation like ‘This equipment is to be used for situational awareness only’; and
- the normal and emergency operating procedures.

Amend the maintenance manual with instructions for carrying out software and database updates.

Amend the ICAs to establish:

- instructions listed in Section 5 of CS-SC001() and/or CS-SC006() and/or CS-SC056() when this SC is installed concurrently with CS-SC001() and/or CS-SC006() and/or CS-SC056(); and/or
- instructions listed in Section 5 of CS-SC005() and/or CS-SC057() when this SC is installed concurrently with CS-SC005() and/or CS-SC057(); or
- in other cases, maintenance actions/inspections and intervals, as required.

## 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC055c

### EXCHANGE OF ADF EQUIPMENT

#### 1. Purpose

Exchange of ADF equipment. This SC does not include installation of antennas.

#### 2. Applicability/Eligibility

Aeroplanes **that are** not ~~being~~ complex motor-powered aircraft, rotorcraft **that are** not ~~being~~ complex motor-powered aircraft with the ADF equipment not connected to ~~AFCS with upper modes~~ **an** integrated FMS navigation system, and any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards ~~s~~ contains **acceptable data**:

- FAA Advisory Circular **AC 43.13-2B**, ~~43-13-2B~~ Chapter 2.

Additionally, the following **conditions** apply**ies**:

- the equipment is authorised in accordance with ETSO-2C41d, or **a** later amendment, or equivalent **standards**;
- the equipment has the same functionality, is installed **in** ~~at~~ the same location, and is compatible with the existing installation (i.e. approval grandfathered under Regulation (EU) No 748/2012), as well as with **the** connections to **the** existing flight management/navigation systems;
- ~~The~~ equipment is ~~qualified~~ **suitable** for the environmental conditions to be expected during normal operations; **see CS STAN.42 in Subpart A for guidance.**; ~~and~~
- **the** instructions and tests defined by the equipment manufacturer have to be followed.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

The **installation of the** equipment ~~installation~~ cannot be used to extend the operational capability of the specific aircraft.

In the case of rotorcraft approved for NVIS, ~~if cockpit panels are to be inserted~~, the change cannot be considered ~~a~~ SC.

In the case of rotorcraft, ~~no SW or AEH should be loaded nor analogic instruments be exchanged with digital instruments or MFD~~ **the ADF equipment cannot be connected to the AFCS or to an integrated FMS navigation system.**

#### 5. Manuals

Amend **the** AFM with **an** AFMS **that** contains **ing** or references **ing** the equipment instructions for operation, as required.

Amend **the** ICAs **to** establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for **the** release to service **of the aircraft** by the ~~P~~ pilot-owner.

## Standard Change CS-SC056c

### INSTALLATION ~~EXCHANGE~~ OF VOR EQUIPMENT

#### 1. Purpose

~~Exchange~~ This SC is for the installation of VOR equipment, including the Localizer/Glideslope indicator and converter. This SC does not include the installation of antennas.

#### 2. Applicability/Eligibility

Aeroplanes that are not being complex motor-powered aircraft, rotorcraft that are not being complex motor-powered aircraft with the VOR equipment not connected to an AFCS with upper modes or an integrated FMS navigation system, and any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contains acceptable data:

- FAA Advisory Circular AC 43.13-2B, ~~43-13-2B~~ Chapter 2.

Additionally, the following conditions apply:

- the equipment is authorised in accordance with ETSO-2C40c, or a later amendment, or equivalent standards;
- the equipment has the same functionality, is installed at in the same location, and is compatible with the existing installation; alternatively, the installation of the equipment does not need the relocation of a required equipment, as defined in the EASA Basic Regulation, e.g. required for the assessment of the type design, or by operating rules;
- the equipment is compatible with the connections to the existing flight management/navigation systems;
- the equipment is qualified suitable for the environmental conditions to be expected during normal operations; refer to CS STAN.42 in Subpart A for guidance;
- the instructions and tests defined by the equipment manufacturer have to be followed.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

The installation of the equipment ~~installation~~ cannot be used to extend the operational capability of the specific aircraft.

In the case of rotorcraft approved for NVIS, ~~if cockpit panels are to be inserted~~, the change cannot be considered an SC.

In the case of rotorcraft, ~~no SW or AEH should be loaded nor analogic instruments be exchanged with digital instruments or MFD~~ the VOR equipment cannot be connected to an AFCS or to an integrated FMS navigation system.

#### 5. Manuals

Amend the AFM with an AFMS that contains ing or references ing the equipment instructions for operation, as required.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

**6. Release to service**

This SC is not suitable for the release to service of the aircraft by the Ppilot-owner.

## Standard Change CS-SC057a

### INSTALLATION OF AN ELECTRONIC CONSPICUITY (EC) FUNCTION

#### 1. Purpose

This SC is for the installation of an electronic conspicuity (EC) function or device to support airborne traffic awareness, and optionally user awareness of obstacles.

*Note 1:* This SC introduces the concept of a function in order to enable its embodiment into another device. Section 3 describes the specific conditions for such an embodiment.

*Note 2:* As with any SC, this SC does not apply to portable electronic devices. In particular, simultaneous ADS-B OUT transmissions from the same aircraft (e.g. installed and portable ADS-B OUT), if not specifically processed by the ground system, generally have a negative impact on ATS.

*Note 3:* The installation of an EC function in accordance with this SC does not automatically ensure compliance with point SERA.6005(c) that requires manned aircraft that operate as uncontrolled traffic in U-space to be electronically conspicuous to U-space service providers.

The installation of a device that integrates FLARM® technology in a manner different from the conditions described in CS-SC051() might be performed using this SC. For example, the installation of a device that emits outside the aeronautical frequency band, on a frequency other than FLARM, and receives FLARM transmissions, could be performed using this SC.

The installation of an electronic conspicuity (EC) function or device may include an integrated antenna and/or an external antenna with the conditions specified in this SC. External antennas can be installed according to CS-SC004a.

#### 2. Applicability/Eligibility

This SC is applicable to:

- aeroplanes that are not complex motor-powered aircraft;
- rotorcraft that meet all the following conditions:
  - have an MTOM of 3 175 kg or less;
  - are certified for a maximum passenger seating configuration of 9 passengers or fewer;
  - are not approved for Category A (CAT A), or equivalent to CAT A, operations;
- ELA2 aircraft.

This SC can be used to install or exchange an electronic conspicuity (EC) function or device in the following cases:

- VFR installations, including night VFR;
- exchange of an existing electronic conspicuity (EC) function or device on an IFR aircraft.

This SC covers the installations of equipment which is not already described in another specific SC.

Transponder-based 1090-MHz extended squitter ADS-B transmitters are the only devices within the aeronautical frequency band for which the technical conditions to obtain a radio licence are harmonised across the EU Member States. This harmonisation excludes 1090-MHz non-transponder devices (NTDs)<sup>17</sup> and UAT devices. The 978-MHz frequency for UAT emitters, although used for ECElectronic conspicuity (EC) function or devices in other countries

<sup>17</sup> See RTCA DO-260B §2.2.2.2.

or continents (such as in the USA), is currently not standardised in the EU. ETSO-C157b<sup>18</sup> states that UAT is not approved for unrestricted usage across the EU. National regulations apply and UAT may only be operated in some EU Member States. This means that the usage conditions for the 978-MHz frequency are specific to each EU Member State, and that such usage may be prohibited in some EU Member States.

### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2; and
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions.

A typical ECElectronic conspicuity (EC) function or device consists of an electronic unit (emission unit and receiving unit) with some embedded and/or external antennas. Such a function or device also includes a means to obtain the aircraft's position, such as an embedded GNSS receiver. It also broadcasts its position. Any compatible receiver in the receiving range, in the air or in the ground, can process such position. This broadcast can use an aeronautical frequency or a non-aeronautical frequency. Similarly, it can receive positions from other aircraft either on an aeronautical frequency and/or on a non-aeronautical frequency. The position of the other aircraft can be directly transmitted or received via a ground service.

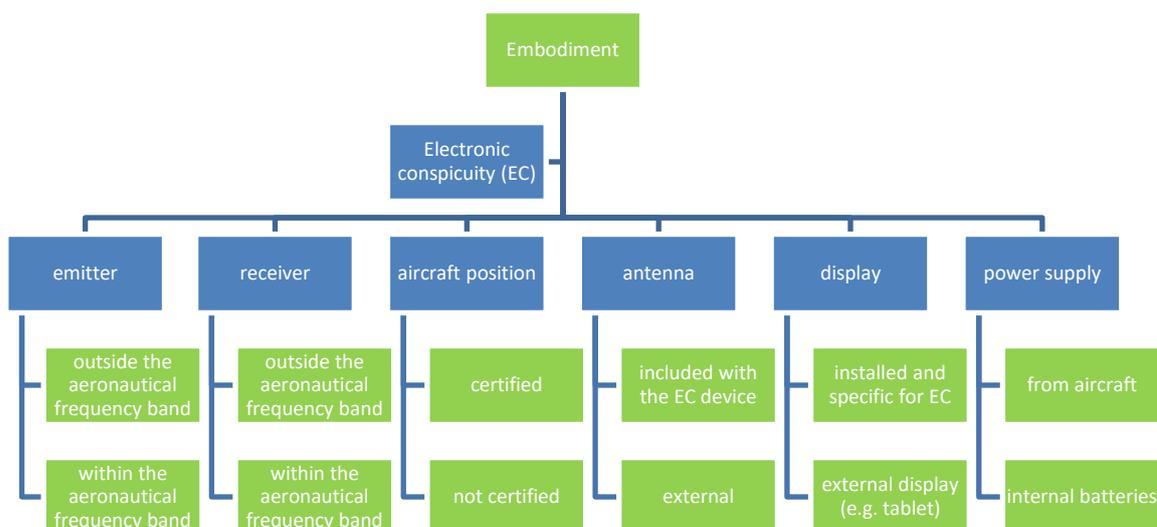
*Note:* An aeronautical frequency is defined as a radio frequency allocated to aeronautical services in accordance with the applicable telecommunications regulations. Technical standards for the use of such frequencies include both the telecommunications and the aviation requirements.

Such an EC function can be combined with another system or integrated into a specific piece of hardware such as a light. In such a case, this SC may be used for the installation of the ECElectronic conspicuity (EC) function or device. The device that embeds this EC function shall be properly qualified for its purpose and shall not be affected in any way by any failure of the ECElectronic conspicuity (EC) function or device. This SC indicates the conditions in the 'embodiment' item.

The equipment manufacturer declares which elements are included in the EC function or device, their related characteristics and the external equipment to which they can be connected. The following diagram and template illustrate one means for the equipment manufacturer to provide declarations for the installation of the various elements.

*Note:* An EC function or device comprises at least the following elements: a position sensor for the aircraft position and a transmitting function (transmitter with antenna). A receiver and a means to display nearby traffic are optional. In the diagram of Figure 1 below, the blue colour indicates the elements that are necessary for the EC device to operate. However, there are several possible options (in green) for each element. An element can include several options such as, for example, one receiver within the aeronautical frequency band and one receiver outside the aeronautical frequency band.

<sup>18</sup> ETSO-C157b is intended for equipment used in the US National Airspace System. UAT is not intended to be operated in European airspace.



**Figure 1: Logical illustration of the elements and the options for an Electronic conspicuity (EC) function or device**

The following table contains the conditions that are applicable to the installation and to any element that is included in the Electronic conspicuity (EC) function or device. For example, if the Electronic conspicuity (EC) function or device does not have an ‘emitter within the aeronautical frequency band’, the related aeronautical declarations/conditions do not apply. In the latter case, the specific telecommunications declarations apply.

Element	Related declarations/conditions
Internal batteries	The equipment manufacturer has declared how the risks associated with internal lithium batteries, if any, were considered. Refer to CS STAN.47 in Subpart A for guidance.
Internal antenna	The equipment manufacturer has declared the size and mass of the antenna to be installed in the cockpit. The installer checks that such an antenna can be installed without obstructing any installed equipment or blocking any exit.
External antenna	The equipment manufacturer declares whether the antenna is certified or not, and the conditions for its installation. Such installations may use CS-SC004(). Antennas that do not emit within the aeronautical frequency band are eligible for installation without an EASA Form 1.
Emitter outside the aeronautical frequency band	The equipment manufacturer shall declare how any such emitter used in the EC function/electronic conspicuity (EC) function or device complies with the applicable telecommunications regulations. The operating manual shall indicate any restrictions and licence conditions as applicable to a specific country or

Element	Related declarations/conditions	
	<p>continent. Such a transmitter is eligible for installation without an EASA Form 1.</p> <p><i>Note 1:</i> Such transmitters generally require a radio or a telecommunications radio or station licence in accordance with national regulations. However, ‘short-range devices’ (SRDs) are low-power radio transmitters that use shared frequency bands on a licence-exempt basis.</p> <p><i>Note 2:</i> SRD frequency bands are harmonised across the EU. However, using SRD bands always means that access to the spectrum is shared with other users and/or other applications. In addition, SRD bands can only be used on a non-protected and non-interference basis: this means that SRDs have to protect themselves and to coexist with each other.</p>	
<p>Emitter within the aeronautical frequency band</p>	<p>Transponder-based 1090-MHz extended squitter ADS-B transmitters</p>	<p>The equipment manufacturer has declared how the transponder was certified and how to install it with an EASA Form 1.</p> <p>CS-SC002() provides one means to install the transponder.</p> <p>CS-SC005() defines one means to add the extended squitter for ADS-B to the transponder.</p>
	<p>1090-MHz non-transponder devices (NTDs)</p>	<p>The equipment manufacturer has indicated that:</p> <ul style="list-style-type: none"> <li>— such elements require a radio licence in accordance with national regulations, even if they comply with ETSO-C166() or equivalent standards;</li> <li>— national regulations may prohibit such usage;</li> <li>— they are only usable in national airspace.</li> </ul> <p>The equipment manufacturer has declared whether the installation needs an EASA</p>

Element	Related declarations/conditions	
		<p>Form 1, under <u>national regulations</u>.</p> <p>The operating manual contains usage restrictions in each EU Member State.</p>
	<p>978-MHz UAT emitters</p>	<p>The equipment manufacturer has indicated that:</p> <ul style="list-style-type: none"> <li>— such elements require a radio licence in accordance with national regulations, even if they comply with ETSO-C154c or equivalent standards;</li> <li>— national regulations may prohibit such usage;</li> <li>— they are only usable in national airspace.</li> </ul> <p>The equipment manufacturer has declared whether the installation requires an EASA Form 1, under <u>national regulations</u>.</p> <p>The operating manual contains usage restrictions in each EU Member State.</p>
<p><i>Note:</i> There have been some SESAR trials for Electronic Visibility via ADS-B (EVA)<sup>19</sup>. In the context of other initiatives, trials have been conducted for UAT weather and traffic<sup>20</sup>. All these local initiatives could provide a pragmatic approach to define suitable requirements. Convergence on a European technical specification with harmonised frequencies will be a necessary step to achieve unrestricted usage across the EU.</p>		

<sup>19</sup> <https://www.sesarju.eu/newsroom/brochures-publications/electronic-visibility-ads%E2%80%90eva>

<sup>20</sup> See Danish UAT Weather & Traffic Trial at <https://www.motorflyvning.dk/uat>.

Element	Related declarations/conditions		
Receiver	<p>The equipment manufacturer has declared whether:</p> <ul style="list-style-type: none"> <li>— the reception is within the aeronautical frequency band and/or outside the aeronautical frequency band;</li> <li>— the receiver holds an ETSO authorisation, or equivalent authorisation;</li> <li>— the receiver requires an EASA Form 1 for installation.</li> </ul> <p><i>Note:</i> Receivers that do not hold an ETSO authorisation, or equivalent authorisation, can be installed without an EASA Form 1.</p> <p>The equipment manufacturer has indicated that receivers with an ETSO operating on the UAT frequency might only receive local services under local conditions. The equipment manufacturer has also indicated whether an EASA Form 1 is required.</p> <p><i>Note:</i> UAT is not intended to be operated in European airspace.</p> <table border="1" data-bbox="679 972 1465 1128"> <tr> <td data-bbox="679 972 1070 1128">           ETSO-C157b receivers or            ETSO-C154c receivers only            (class A2)         </td> <td data-bbox="1070 972 1465 1128">           Some trials or services might            be provided locally.            Local conditions apply.         </td> </tr> </table>	ETSO-C157b receivers or ETSO-C154c receivers only (class A2)	Some trials or services might be provided locally. Local conditions apply.
ETSO-C157b receivers or ETSO-C154c receivers only (class A2)	Some trials or services might be provided locally. Local conditions apply.		
Aircraft position	<p>The equipment manufacturer has declared whether the aircraft position source holds an ETSO authorisation, or equivalent. The equipment manufacturer has indicated whether the installation of the position source requires an EASA Form 1.</p> <p><i>Note:</i> Position sources that do not hold an ETSO authorisation, or equivalent authorisation, can be installed without an EASA Form 1.</p>		
Display	<p>The equipment manufacturer has provided a means (specific display or portable unit) to display the traffic received by the EC function. The equipment manufacturer has provided instructions to install such a specific display in a manner that ensures that this specific display is independent from any display associated with a unit required for the intended operation.</p> <p>The components of the EElectronic conspicuity (EC) function or device can be of any colour, provided the colours differ sufficiently</p>		

Element	Related declarations/conditions
	<p>from the colours used for warnings, cautions, and advisories, to avoid possible confusion.</p> <p>The equipment manufacturer has provided instructions to install such a display so that it does not obstruct the primary field of view of equipment that is essential for the safe operation of the aircraft.</p> <p>The equipment manufacturer has indicated whether the installation of the position source requires an EASA Form 1.</p>

Element	Related declarations/conditions
Embodiment	<p>The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for γυιδανχε.</p> <p>Any non-ETSO transmitter shall be located away from the aircraft instrument required for the flight to minimise the risk of interference.</p> <p>The equipment might include an obstacle awareness function.</p> <p>The equipment manufacturer has declared that the ECElectronic conspicuity (EC) function or device exclusively relies on its own systems/units in order to provide its intended function. Databus/data connectivity between the ECElectronic conspicuity (EC) function or device and other equipment which is:</p> <ul style="list-style-type: none"> <li>— ETSO authorised (or equivalent authorisation); or</li> <li>— required by the TDCS, AFM or POH; or</li> <li>— required by other applicable requirements such as those for operations and airspace,</li> </ul> <p>is not allowed unless the ECElectronic conspicuity (EC) function or device is explicitly listed by its manufacturer as compatible equipment to which the other equipment can be connected.</p> <p>If the ECElectronic conspicuity (EC) function or device is included in a part or appliance that is required for the flight, then the equipment manufacturer has declared that all the elements of the electronic conspicuity (EC) function or device contributing to the required part or appliance are certified. The equipment manufacturer has provided the declarations associated with the required part or appliance. Such declarations explicitly include instructions for installation with or without an EASA Form 1. For example, an electronic conspicuity (EC) function or device included in a position light and an anti-collision light shall comply with ETSO-C30c and ETSO-C96a, or equivalent standards. CS-SC031b may be used to install the light. If the unit emits in the UAT frequency band, the conditions for the transmitter within the aeronautical frequency band above would also apply.</p>

- The installer may only install parts included in the ECElectronic conspicuity (EC) function or device with an EASA Form 1, unless the equipment manufacturer has explicitly declared that the parts can be installed without an EASA Form 1.
- If the electronic conspicuity (EC) function or device is not exclusively powered by internal batteries, the following conditions apply:

- The installer follows the guidelines set out in Chapter 2 of FAA Advisory Circular AC 43.13-2B or equivalent standards.
- The installer verifies that the power consumption is compatible with the aircraft installation. The results of the electrical-load analysis are recorded, or referred to, in EASA Form 123.
- The installer follows the instructions from the equipment manufacturer for electrical protection.
- If a non-essential supply (bus bar) exists, the installer uses this bus to power the electronic conspicuity (EC) function or device.
- The installer follows the wiring instructions from the equipment manufacturer and the guidelines from FAA AC 43.13-1B or equivalent standards.
- The maximum mass of the EC device does not exceed 300 g. For a mass slightly above 300 g, the installer shall assess the compatibility of the mounting instructions from the equipment manufacturer with the characteristics of the intended mounting location.
- The electronic conspicuity (EC) function or device may be permanently fitted to the aircraft or it may use a mounting system that may be installed by following the conditions of CS-SC105().
- The installer follows the equipment manufacturer instructions and tests.
- The installer performs ground tests in order to assess whether the performance of the installation is adequate, and complements or substitutes ground tests with installation check flights, as necessary. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights.

Such tests shall verify whether the arrangement of the EElectronic conspicuity (EC) function or device in the cockpit is suitable (in particular, no impairment of the pilot's view, absence of glare and reflections), as well as the electrical bonding, the correct functioning of all other equipment installed in the aircraft, and the lack of interference (EMI/EMC) with other systems. FAA Advisory Circular AC 43.13-1B, Chapter 11, or ASTM F2639-18 or subsequent revisions, provide an acceptable means to perform an EMI/EMC test.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

In the case of aircraft approved for NVISs/NVGs, the change cannot be considered a SC.

This SC cannot generally be used to extend the operational capability of the specific aircraft. However, this does not preclude the installation of another SC that enhances operations. One typical example is the concurrent installation of a Mode S transponder according to CS-SC002c conditions.

The outputs of the EC function or device provide traffic indications. The information generated by the EC function or device can be presented visually, audibly, or both visually and audibly, to provide pilots with information on other nearby traffic. The outputs of the EC function or device must not be input to an AFCS or to any system required by airworthiness or operational rules.

The EElectronic conspicuity (EC) function or device must NOT give any advice on how to avoid traffic.

The installed EElectronic conspicuity (EC) function or device must not generate alerts that override other alerts generated by other rotorcraft systems that need more immediate crew action.

The use of an EElectronic conspicuity (EC) function or device is limited to prompting an additional visual scan for traffic and/or obstacles displayed by the EC function.

For IFR aircraft, a display installed as part of this SC can only replace an existing display that is not required for the specific operation.

All the relevant integrated databases (e.g. for obstacles) must be current.

## **5. Manuals**

Amend the aircraft maintenance manual (AMM) with instructions for carrying out software and database updates.

Amend the AFM with an AFMS to include information stating 'For airborne traffic awareness and obstacle situational awareness only (as applicable)' or similar information, together with any necessary operating instructions, procedures or limitations. Instructions should remind operators to regularly update obstacle databases.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

## **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC059a

### INSTALLATION OF A GYROSCOPICALLY STABILISED DIRECTION INDICATOR

#### 1. Purpose

This SC is for the new installation of a magnetic or non-magnetic gyroscopically stabilised direction indicator.

#### 2. Applicability/Eligibility

This SC is applicable to:

- aeroplanes that are not complex motor-powered aircraft and that are limited to operate in day VFR conditions only;
- ELA2 aircraft that are limited to operate in day VFR conditions only;
- rotorcraft that are not complex motor-powered aircraft, provided all the following conditions apply:
  - they do not have an AFCS that receives data from the direction indicator;
  - they are not certified for Category A (CAT A) operations;
  - they are limited to operate in day VFR conditions only.

#### 3. Acceptable methods, techniques, and practices

The following standard contains acceptable data:

- FAA AC 43.13-2B, Chapter 11, or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- The instrument is authorised according to ETSO-C5f, ETSO-C6e or a later amendment, or equivalent standards.
- The instrument is compatible with the connections to the existing flight management/navigation systems.
- The instrument is consistent with the overall flight deck design in terms of colour coding and symbology.
- The instrument is suitable for the environmental conditions to be expected during normal operations; refer to CS STAN.42 in Subpart A for guidance.
- The instrument does not introduce any glare or reflections that could interfere with the pilot's vision. This condition applies to the instrument for all operations for which certification is requested.
- The selection/calibration of the instrument must be such that, under the same conditions, the indications provided by the existing direction indicators are the same.
- The instructions and tests defined by the equipment manufacturer have to be followed.
- An installation check flight is conducted to assess the installation for satisfactory behaviour, non-interference and no glare or reflections that could impair the pilot's vision. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights.

#### **4. Limitations**

The system is to be used for situational awareness only.

The installation of the equipment cannot be used to extend the operational capability of the specific aircraft (e.g. from VFR to IFR).

Any limitations defined by the equipment manufacturer apply.

#### **5. Manuals**

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

#### **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC060a

### INSTALLATION OF A SECONDARY ATTITUDE INDICATOR

#### 1. Purpose

This SC is for the installation of a secondary attitude indicator and its associated external sensors/interfaces, as applicable.

*Note 1:* A primary attitude indicator is required for VFR at night and for IFR operations. A secondary attitude indicator can be voluntarily installed when no standby attitude indicator is required and/or in addition to a required primary attitude indicator.

*Note 2:* The secondary attitude indicator may include further secondary instruments, e.g. direction indication, airspeed, altitude, turn rate.

#### 2. Applicability/Eligibility

Aeroplanes that are not complex motor-powered aircraft, and any ELA2 aircraft.

This SC can be used to install a secondary attitude indicator in the following cases:

- aeroplanes that are not complex motor-powered aircraft and ELA2 aircraft certified to operate only in VFR conditions (including VFR at night);
- aeroplanes for which no airworthiness or operational regulations require an attitude indicator;
- aeroplanes that are not complex motor-powered aircraft and ELA2 aircraft certified to operate also in IFR conditions provided that one of the following cases applies:
  - an exchange of an existing secondary attitude indicator ;
  - a substitution of the on-board clock; or
  - an exchange of a rate-of-turn indicator according to FAA AC 91-75.

*Note:* According to AMC1 NCO.IDE.A.120(a)(2) and NCO.IDE.A.125(a)(2), for non-commercial operations in VFR or IFR conditions, ‘a means of measuring and displaying the time in hours, minutes and seconds may be a wristwatch capable of the same functions’. Consequently, the on-board clock can be replaced by a secondary attitude indicator . FAA AC 91-75 provides a method to substitute an approved attitude indicator for a rate-of-turn indicator.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2; and
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- The secondary attitude indicator :
  - complies with ETSO-C4c and ETSO-C113, or later amendments, or equivalent standards; any optional additional secondary instrument (e.g. direction indication, airspeed, altitude, turn rate) is also authorised according to the applicable ETSO, or equivalent standards;

- has been certified on a similar aircraft by EASA or by a civil aviation authority of a third country that has entered into a bilateral agreement with the EU<sup>21</sup>.
- If the secondary attitude indicator includes rechargeable lithium cells and lithium batteries, then the CS-SC034() conditions for the specific type of battery apply. Batteries authorised in accordance with ETSO-C179a or a subsequent version are considered optimal; however, batteries authorised according to TSO-C179 are acceptable in the context of this SC.
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for γυιδανχε.
- The equipment manufacturer installation instructions and tests have to be followed.
- The secondary attitude indicator must be similar in form, fit and mass to the unit it replaces. Alternatively, the secondary attitude indicator can be installed in an empty location, provided that such installation does not impair the access and visibility to the instruments required by airworthiness or operational regulations.
- If the secondary attitude indicator is not exclusively powered by internal batteries, the following conditions apply:
  - The installation meets the electrical requirements set out in Chapter 2 of FAA Advisory Circular AC 43.13-2B.
  - The installer verifies that the power consumption is compatible with the aircraft installation. The results of the electrical-load analysis are recorded, or referred to, in EASA Form 123.
  - The installer follows the equipment manufacturer instructions for electrical protection.
  - If a non-essential supply (bus bar) exists, the secondary attitude indicator is powered from this bus.
- For the substitution of a rate-of-turn indicator, all the additional conditions from FAA AC 91-75 apply. Moreover, the equipment manufacturer has declared that the equipment is suitable for the specific aircraft type and intended operation. The installer additionally checks compatibility in the particular aircraft.
- A ground post-installation test shall verify the electrical bonding, the correct functioning of all other equipment installed in the aircraft and the lack of interference (EMC/EMI) with other systems. FAA Advisory Circular AC 43.13-1B Chapter 11 provides an acceptable means to perform an EMI/EMC test.
- An installation check flight is conducted to assess whether the performance of the secondary attitude indicator is adequate. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

This SC cannot be used to extend the operational capability of the specific aircraft (e.g. by adding a 'standby' attitude indicator that would be required for an extension of the operational capability).

<sup>21</sup> Refer to <https://www.easa.europa.eu/document-library/bilateral-agreements>.

This SC cannot be used to install or exchange a primary attitude indicator (e.g. as required for VFR at night or for IFR operations) or a standby attitude indicator.

The embodiment of this SC as a replacement for an on-board clock is limited to aircraft that are non-commercially operated.

A unit installed using this SC cannot provide inputs to an AFCS.

## **5. Manuals**

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

When the SC replaces the on-board clock with a secondary attitude indicator, the AFMS shall indicate that the pilot shall carry a means of measuring and displaying the time in hours, minutes, and seconds. A wristwatch capable of the same functions is an acceptable means.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

## **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC061a

### INSTALLATION OF AN AIRCRAFT TRACKING SYSTEM

#### 1. Purpose

This SC is for the installation of an aircraft tracking system and its associated external sensors/interfaces, as applicable. An aircraft tracking system may include a flight-time recorder as defined in CS-SC106(). However, lightweight cameras are not included in this SC; they may be installed using the conditions defined in CS-SC403().

Additionally, the installation of an aircraft tracking system may include an integrated antenna or a dedicated antenna with the conditions specified in this SC. Other types of antennas can be installed according to CS-SC004().

#### 2. Applicability/Eligibility

This SC is applicable to:

- aeroplanes that are not complex motor-powered aircraft;
- rotorcraft that are not complex motor-powered aircraft and that are not certified for Category A (CAT A) operations;
- any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2; and
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions.

A typical aircraft tracking system may include an electronic unit, a GNSS receiver, a GNSS antenna, and a specific antenna/receiver/transmitter which uses frequencies outside the aeronautical frequency bands (meaning on frequencies, e.g. GSM, allocated to aeronautical services in accordance with telecommunications regulations).

Additionally, the following conditions apply:

- All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- The equipment manufacturer installation instructions and tests must be followed.
- The maximum mass of the aircraft tracking system must not exceed 300 g.
- The electronic unit must be located in a location away from the aircraft instruments. The installer shall follow any documented instruction as regards the distance from any required equipment for interference protection. Additionally, the installation must not obstruct the primary field of view of equipment that is essential for the safe operation of the aircraft. The aircraft tracking system may be permanently fitted to the aircraft or it may use a mounting system that may be installed by following the conditions of CS-SC105().

*Note:* In particular, it is important to securely tie down the aircraft tracking system. Possible locations for the electronic unit include in or above the glove box, or on the floor of the cabin under the seats.

- The aircraft tracking system relies exclusively on its own systems/units.

Data bus connectivity between the aircraft tracking system and other equipment, which is:

- ETSO authorised (or equivalent authorisations);
- required by the TDCS, AFM or POH; or
- required by other applicable requirements, such as those for operations and airspace,

is not covered by this SC.

*Example:* For instance, if an aircraft is fitted with a GNSS unit installed according to CS-SC005() in Configuration 1 or 2, such a GNSS unit cannot be used to provide position information for the aircraft tracking system. However, there is no restriction on reusing the GNSS unit installed according to CS-SC005() in Configuration 3 for the aircraft tracking system, since this GNSS unit is neither approved nor required.

- If a non-essential supply (bus bar) exists, the installer must use this bus to power the aircraft tracking system. Alternatively, the aircraft tracking system is powered by batteries. The equipment manufacturer has declared how the risks associated with internal lithium batteries, if any, were considered. Refer to CS STAN.47 in Subpart A for additional guidance on the conditions for the installation of internal lithium batteries.
- For any antenna included or installed with the aircraft tracking system, the following means are acceptable:
  - an antenna integrated into the aircraft tracking system or installed in the cockpit with a size and mass that can be assessed together with the aircraft tracking system for crashworthiness, interference, and structural integrity; or
  - an external antenna can be installed according to CS-SC004().
- A ground test shall assess whether the performance of the installation is adequate. An installation check flight may be performed instead of, or in combination with, a ground test. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights. Such tests shall verify that the arrangement of the aircraft tracking system in the cockpit is suitable (in particular, no impairment of the pilot's view, and the absence of glare and reflections), the electrical bonding, the correct functioning of all other equipment installed in the aircraft and the lack of interference (EMI/EMC) with other systems. FAA Advisory Circular AC 43.13-1B Chapter 11, or ASTM F2639-18 or subsequent revisions, provides an acceptable means to perform an EMI/EMC test.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

In the case of aircraft approved for NVISs/NVGs, the change cannot be considered a SC.

This SC is not suitable for deployable equipment<sup>22</sup>.

This SC cannot be used to extend the operational capability of the specific aircraft (e.g. the mandatory recording requirement).

<sup>22</sup> As per EUROCAE ED-155 'Minimum Operational Performance Specification for lightweight flight recording systems', 'A deployable recorder is any robust recording system (ADRS, CARS or other) which is designed to be automatically separated from the aircraft only in the event of an accident.'

Any transmitter used in this SC must not transmit in the aeronautical frequency bands (meaning on frequencies allocated to aeronautical services in accordance with telecommunications regulations). Additionally, any such transmitter must comply with the applicable telecommunications regulations. The operating manual shall indicate any restrictions on the usage of the related frequencies as applicable to a specific country or continent. The aircraft tracking system can integrate a receiver within or outside the aeronautical frequency band.

Generally, the aircraft tracking system cannot be used as a substitute for the logbook record requirements that are mandated by Commission Regulation (EU) No 965/2012<sup>23</sup> (in particular point CAT.GEN.MPA.180 of Annex IV) and Commission Regulation (EU) No 1178/2011<sup>24</sup> (in particular points FCL.130.S, FCL.710, FCL.720 and FCL.135.A of Annex I).

## 5. Manuals

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required. In particular, provide a wiring diagram that depicts the equipment installation.

## 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

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<sup>23</sup> Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R0965&from=EN>).

<sup>24</sup> Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 311, 25.11.2011, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1524553458669&uri=CELEX:02011R1178-20160408>).

## Standard Change CS-SC062a

### INSTALLATION OF AN AWARENESS FUNCTION OR AWARENESS DEVICE

#### 1. Purpose

This SC is for the installation of an awareness function or awareness device.

Definition: An awareness function or awareness device aids the pilot in making them aware of what is going on outside the aircraft. The main purpose is to support successful decision-making across a broad range of situations in flight. An awareness function or awareness device is not required by the airworthiness or operational requirements. An awareness function or awareness device provides useful cues on the status of the aircraft and on the surrounding environment. The awareness function or awareness device may contain a receiver and/or a display. The awareness function or awareness device does not emit within the aeronautical frequency band. However, it can emit outside the aeronautical frequency band. The installation of an emitter within the aeronautical frequency band can be performed with other SCs or other means.

Note: This SC introduces the concept of function in order to enable the embodiment of the function into another device.

The installation of an awareness function or awareness device may include an integrated antenna with the conditions specified in this SC. An external antenna can be installed according to CS-SC004().

This SC covers equipment installations that are not already described in any other specific SC.

Examples of the data and functionality provided by such an awareness function or awareness device include but are not limited to the outside air temperature, weight/balance information, nearby aerodromes, checklists, an aviation calculator, flight planning, a combined display from existing cockpit data sources, etc.

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes that are not complex motor-powered aircraft, and to any ELA2 aircraft.

This SC can be used in the following cases:

- to install or exchange an awareness function or awareness device on a VFR aircraft (including VFR at night);
- to exchange an existing awareness function or awareness device on an IFR aircraft.

However, this SC cannot be used to extend the operational capability of the specific aircraft (e.g. conversions to VFR at night or to IFR operations).

This SC excludes equipment installations that are already described in other specific SCs. It also excludes any equipment that is required for airworthiness purposes or to comply with any related regulation. Additionally, it also excludes the functions that are specifically excluded in the other SCs (e.g. weather radar). Finally, it cannot be used to install any type of transmitter within the aeronautical frequency band.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2; and
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions.

The following additional requirements and conditions apply:

- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for γυιδαρχε.
- All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.
- The equipment manufacturer installation instructions and tests have to be followed.
- The electronic unit shall be located away from the aircraft instrument required for the flight in order to minimise the risk of interference. The installer shall follow any documented instruction as regards the distance from any required equipment for interference protection. Additionally, the installation shall not obstruct the primary field of view of equipment that is essential for the safe operation of the aircraft.
- The awareness function or awareness device may be permanently fitted to the aircraft or it may use a mounting system that may be installed by following the conditions of CS-SC105().
- The components of the awareness function or awareness device can be of any colour, provided the colours differ sufficiently from the colours used for warnings, cautions, and advisories, to avoid possible confusion.
- If the awareness function or awareness device is not exclusively powered by internal batteries, the following conditions apply:
  - The installation meets the electrical requirements set out in Chapter 2 of FAA Advisory Circular AC 43.13-2B.
  - The installer verifies that the power consumption is compatible with the aircraft installation. The results of the electrical-load analysis are recorded, or referred to, in EASA Form 123.
  - The installer follows the instructions from the equipment manufacturer for electrical protection.
  - If a non-essential supply (bus bar) exists, the awareness function or awareness device is powered from this bus.
- The equipment manufacturer has declared how the risks associated with internal lithium batteries, if any, were considered. Refer to CS STAN.47 in Subpart A for guidance.
- Any optional receiver is eligible for installation without an EASA Form 1.
- An optionally integrated antenna must be assessed together with the installation of the awareness function or awareness device for crashworthiness, weight and balance, interference, and structural integrity. Such an integrated antenna is eligible for installation without an EASA Form 1.
- An optional external antenna might be installed according to CS-SC004().
- Any optional transmitter used in the awareness function or awareness device must not emit within the aeronautical frequency bands (meaning on frequencies allocated to aeronautical services in accordance with telecommunications regulations). It must comply with the applicable telecommunications regulations. The operating manual shall indicate any restrictions in the usage of related frequencies as applicable to a specific country or continent. Such a transmitter is eligible for installation without an EASA Form 1.
- Any optional display:
  - may be installed without an EASA Form 1;
  - shall be independent from any display associated with a unit required for the intended operation.

- A ground post-installation test shall verify the electrical bonding, the correct functioning of all other equipment installed in the aircraft, and the lack of interference (EMI).
- An installation check flight is conducted to assess the proper functioning of the awareness function or awareness device, unless a ground test can adequately assess all the features from such an awareness function or awareness device. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights.

#### **4. Limitations**

Any limitations defined by the equipment manufacturer apply.

This SC cannot be used to extend the operational capability of the specific aircraft.

The awareness function or awareness device must not be connected to a system other than a non-required display.

The maximum mass of the awareness function or awareness device does not exceed 300 g.

This SC does not enable the installation of a display in an IFR aircraft, unless such a display replaces another display that is not required for the specific operation.

This SC does not enable the installation of any awareness function or awareness device that is required for compliance with airworthiness or operational regulations.

#### **5. Manuals**

Amend the AFM with an AFMS to include information stating 'Information to be used to support VFR situational awareness only' or similar information, together with any necessary operating instructions, procedures or limitations.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC081<sup>ab</sup>

### EXCHANGE OF TYRES (INNER TUBES/OUTER TYRES)

#### 1. Purpose

This SC is intended to allow **the** exchange of tyres (i.e. the change of inner tubes and/or outer tyres) ~~with a~~ **for** different tubes/tyres of the same size and strength.

#### 2. Applicability/Eligibility

Sailplanes, including powered sailplanes.

#### 3. Acceptable methods, techniques, and practices

Information ~~by~~ **from** the aircraft manufacturer or STC holder needs to be observed to avoid damage to the wheel/brake system / landing gear installation.

Typically, the change may only be performed by ~~uninstalling~~ **un-installing** the relevant wheel and/or ~~disassembling~~ **disassembly of** the brake system.

Often the aircraft needs to be placed on jacks, or the fuselage needs to be turned upside down (in **the** case of disassembled sailplanes) to allow such a disassembly. Information ~~of~~ **from** the manufacturer or STC holder needs to be observed for the jacking or turning **the fuselage** upside down.

As tyres increase in size with time, ~~and~~ a new tube may move **with** in such a worn-out tyre, and an old tube may chafe in a new tyre more easily, **so** it is recommended to always replace both the tyre and the tube at the same time.

Tyres shall only be replaced ~~by~~ **with** tyres **that have** ~~ing~~ the same size, static load rating and ply rating.

Ensure that a replacement tube is of the correct size for the tyre.

After installation:

- bring the tyre/tube to the pressure according to the aircraft manufacturer or STC holder data (ensuring that the rated pressure of the replacement tyre/tube is not exceeded);
- check **the** proper functioning **ing** of the brake system and **the** landing gear retraction system when applicable;
- check that the tyre has the required minimum space ~~for~~ **to** turning ~~ing~~ freely.

It is recommended to indelibly mark the alignment between **the** tyre and **the** wheel to allow for a later check of any relative movement.

**The tyre is eligible for installation without an EASA Form 1, provided that:**

- **the characteristics of the tyre are identified and are similar to those of the original tyres;**
- **a form, fit and function test is performed by the installer.**

#### 4. Limitations

~~N~~ **n/a**

## 5. Manuals

N/a

If a pre-flight tyre inspection is not already included in the relevant documentation, and in cases of installation of tyres without an EASA Form 1, amend the AFM with an AFMS that contains the following recommendations:

- Perform a regular pre-flight tyre inspection before each flight.
- If any damage is visible, tyres have to be replaced.

## 6. Release to service

This SC is ~~not~~ suitable for the release to service of the aircraft by the ~~P~~ pilot-owner.

## Standard Change CS-SC082<sup>ab</sup>

### EXCHANGE OF SKIDS ON WING TIPS / FUSELAGE TAILS

#### 1. Purpose

This SC is intended to allow **the** exchange of skids, typically made of rubber or other elastic material, installed on fuselage tails and/or wing tips. This may be required to exchange a different skid of comparable size and strength, **or to** exchange ~~of~~ a rubber skid **by for** a rubber skid with a small wheel.

#### 2. Applicability/Eligibility

Sailplanes, including powered sailplanes.

#### 3. Acceptable methods, techniques, and practices

Before **the** exchange, the old skid and any remnants of the old bonded skid/glue need to be removed.

Information **by from** the aircraft manufacturer or STC holder needs to be observed to avoid damage to the skid or installation area.

Typically, the installation is **performed** by gluing the rubber skid to the surface of the underside of the wing or **the** fuselage tail.

The glue to be used may be of an industrial glue type (e.g. 'Pattex<sup>®</sup>') or an acrylic mounting glue (e.g. 'Sikaflex<sup>®</sup>').

Before performing the new glue bonding, clean all **the** surfaces and prepare to press the new skid to the bonding joint during drying/polymerisation of the glue.

After bonding, it is recommended to seal the glue joint by means of **a** tape to prevent dirt or grass ~~to~~ entering **into** the glue joint.

If the aircraft manufacturer or STC holder requires a wire deflector to prevent **the** capture of a winch wire at the glue joint of a tail skid, then such a deflector needs to be installed. ~~Otherwise,~~ such a deflector (which could be a strong steel wire at the leading edge of the tail skid) is recommended.

When changing to a rubber skid with **a** small wheel, it is recommended to test the strength of the wheel by dropping the tail/wing tip from a height with the new ~~installed~~ skid **installed**, which simulates the dropping of the tail or wing tip during a landing.

~~The~~ use of this SC for **the** installation of a skid which is installed by means of screws or bolts is permitted only for replacement by the same type of skid.

After installation, verify that the movement of the flight controls is not impaired by the new skids. The exchange is not allowed if the new skids ~~do are~~ not ~~have of~~ the proper size (i.e. the required movement of the control surfaces is more limited than with the old skids).

Additionally, a weight and balance report should be completed to show that the aircraft with the new skid is within the weight and balance limits defined by the aircraft manufacturer for the empty aircraft.

**The skid is eligible for installation without an EASA Form 1, provided that:**

- a form, fit and function test is performed by the installer;**
- the size and the form of the installed skid are similar to those of the original one;**
- no front gap is created.**

Figure 1 below shows the location where a gap should be avoided:

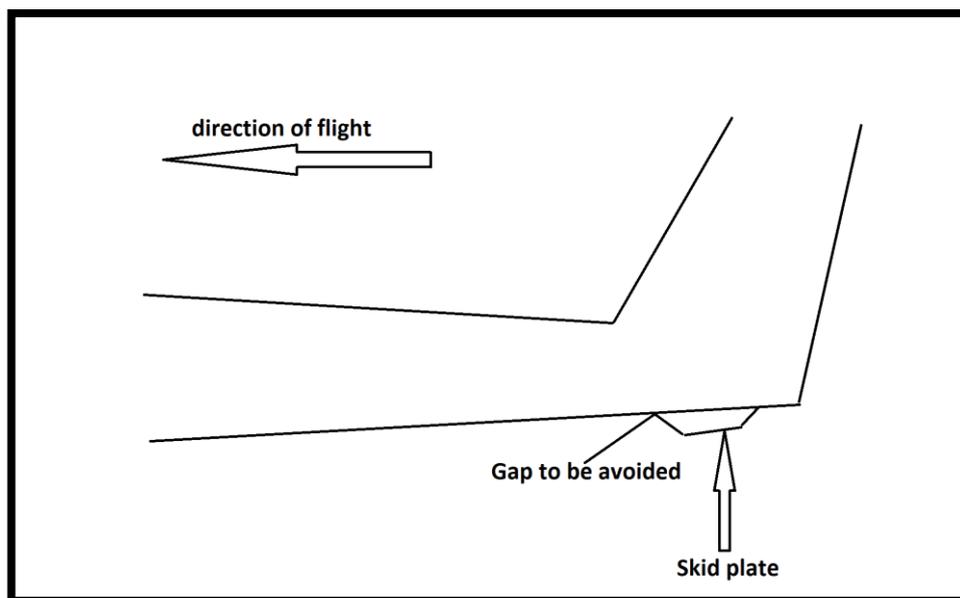


Figure 1 — Gap to be avoided

#### 4. Limitations

N/a

#### 5. Manuals

N/a

If a pre-flight skid inspection is not already included in the relevant documentation, and in cases of installation of a skid without an EASA Form 1, amend the AFM with an AFMS that contains the following recommendations:

- Perform a regular pre-flight skid inspection before each flight.
- If any gap or damage is visible, the skid must be replaced.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC083<sup>ab</sup>

### EXCHANGE OF FLEXIBLE SEALS ON CONTROL SURFACES

#### 1. Purpose

This SC is intended to allow the exchange of flexible seals as installed on control surfaces on wings and the empennages, and/or to change the joint means of the seal (e.g. use of screws/bolts instead of glue-type joint).

#### 2. Applicability/Eligibility

ELA1 aircraft.

#### 3. Acceptable methods, techniques, and practices

Typically, the installation is by bonding tape to the surfaces of the control surface and/or wing or tail surface.

Before the exchange, the old seal and any left-overs remnants of the old bonded seal/glue need to be removed.

Any applicable instructions provided by the aircraft manufacturer or STC holder must be applied to avoid damage to the installation area.

In addition to the use of self-adhesive tapes, glue of an industrial glue type for flexible seals needs to be used.

Before performing the new glue bonding, clean all the surfaces and prepare to press the new seal to the surface during drying/application.

Check for full displacement of any control surface after installation of the new seals — it is good practice to do this on a disassembled aircraft, as the disassembled wing/tail area may have more rudder deflection range than after installation on the aircraft.

When changing to a Mylar-type of seal (or a metal seal), it is recommended to test that the Mylar tape (or the metal strip) is in contact ~~to~~ with the control surface over the full range of the control surface movement to prevent a reduction of performance or later noise during deflections.

The exchange is not allowed if the seals ~~do~~ are not ~~have~~ of the proper size (i.e. are not long enough, so that parts of the control surface have no seal installed, or expose a gap in the sealing towards full control surface deflection).

Additionally, verify that the movement of the flight controls is not impaired by the new seals.

After installation of the replacement seals, a check during the next flight ~~against~~ for noises generated by the new seals or influence upon controllability shall be performed, and if successful, a qualitatively satisfactory result is recorded, or referred to, in the EASA Form 123.

After installation of the replacement seals, fly the aircraft to qualitatively assess the effects on noises and any influence upon controllability to exclude negative effects on the flight and stall characteristics. Refer to CS STAN.48 in Subpart A for guidance.

*Note:* The above-mentioned flight is considered part of this SC and can be conducted without a certificate of release to service for the SC, as long as there is no other ongoing maintenance activity ongoing on the aircraft (i.e. other maintenance which has not yet been released to service). The flight should be conducted by a pilot who understands the aircraft configuration (i.e. exchange of flexible seals not yet released to service). EASA Form 123 and the certificate of release to service for the installation of the SC should be issued after assessing satisfactorily that the result is satisfactory.

A flexible seal is eligible for installation without an EASA Form 1, provided that a form, fit and function test is performed by the installer.

**4. Limitations**

N/a

**5. Manuals**

N/a

If a pre-flight inspection of the flexible seals is not already included in the relevant document, and in cases of installation of seals without an EASA Form 1, amend the AFM with an AFMS so that it contains the following recommendations:

- Perform a regular pre-flight inspection of the flexible seals before each flight.
- If any debonding or damage is visible, the flexible seal must be replaced.

**6. Release to service**

This SC is not suitable for the release to service of the aircraft by the P pilot-owner.

## Standard Change CS-SC086b

### EXCHANGE OF A BALLOON ~~BOTTOM END~~

#### 1. Purpose

This SC is for the replacement of a complete ~~bottom end~~ with a different one that is part of the type certificate of another approved balloon.

A complete ~~bottom end~~ comprises the basket, the burner frame, the burner, the fuel cylinders and the fuel hoses of a single manufacturer.

*Note:* In a balloon, the envelope identifies the aircraft registration, the type certificate and the serial number. Changing the ~~bottom end~~ is considered ~~to be~~ a modification to the aircraft type design, i.e. it results in a modified balloon. The certificate of airworthiness, the aircraft flight manual (AFM), the aircraft logbook, etc., belong to the modified balloon (i.e. they 'remain' with the envelope).

#### 2. Applicability/Eligibility

This SC is applicable to hot-air balloons, as defined in ELA1, which are used in non-commercial operations.

#### 3. Acceptable methods, techniques, and practices

The following considerations apply:

- The maximum take-off mass of the modified configuration shall not be greater than ~~that of~~ the original one. Consider limiting factors like ~~the bottom end~~ payload and burner performance.
- The minimum landing mass of the modified balloon must be greater than or equal to the approved minimum landing mass of the original balloon. If the minimum landing mass is not defined, a good estimate is  $\frac{150 \text{ kg}}{1\,000 \text{ m}^3}$ .
- The performance of the burner must be adequate for the size of the envelope. Guidance on the adequacy of the performance of the burner can be derived from the TCDS.
- If the dimensions of the basket (width to length) exceed the proportions of 1 to 1.3, the envelope must be equipped with turning vents.
- The number of attachment points for the basket wires in the original configuration must be the same as in the new configuration after the exchange.
- The means of attachment of the flying wires must be the same as in the original configuration (e.g. replace carabiners with carabiners, shackles with shackles).
- The burner frame geometry regarding the position of the attachment points must be congruent (same dimension in x and y direction, in the same plane).
- If a ~~bottom end~~ from manufacturer A is combined with an envelope from manufacturer B, then:
  - check that the geometry of the attachment points of the ~~bottom end~~ from manufacturer A is identical to the geometry of the attachment points of the burner frame from manufacturer B, as referenced in the flight manual of manufacturer B for the selected envelope;
  - a tolerance of maximum 25 mm between the two attachment points is acceptable.

- The owner is responsible for the ~~continued~~ continuing airworthiness of the changed configuration.
- The aircraft maintenance programme must be amended according to the new configuration.
- The equipment list must be amended in accordance with AMC M.A.801 or AMC1 ML.A.801, as applicable, to record all the parts of the new configuration.

#### 4. Limitations

All parts must be included in an EASA-approved type design.

All parts must be accompanied by an EASA Form 1, or an equivalent airworthiness certificate, or be listed in the equipment list associated with a valid airworthiness review certificate.

Any limitations defined by the manufacturers of the ~~bottom end~~ ~~bottom-end~~ and the envelope apply.

Modifications to the flying wires, e.g. lengthening or shortening of the wires and their attachments, is prohibited, unless defined in the ICAs by the TC holder.

#### 5. Manuals

The flight manual of the modified configuration must be supplemented by manufacturer-specific information ~~of~~ on the ~~bottom end~~ ~~bottom-end~~ and should contain, at least, the following:

- a description of the system, its operating modes and its functionality;
- the limitations and warnings;
- the emergency and normal operating procedures; and
- the ICAs.

#### 6. Release to service

This SC may be released by the pilot-owner subject to compliance with AMC M.A.801 or AMC1 ML.A.801, as applicable.

## Standard Change CS-SC087a

### EXCHANGE OF BALLOON SPARE PARTS

#### 1. Purpose

This SC is for the exchange of certain balloon parts/equipment.

#### 2. Applicability/Eligibility

This SC is applicable to balloons, as defined by ELA2 aircraft.

Limited to the exchange of control cords, this SC is not applicable to gas balloons certified for flammable lifting gas.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- the balloon maintenance manual;
- FAA Advisory Circular AC 43.13-1B;
- FAA Advisory Circular AC 43.13-2B.

The exchange of parts is limited to the following items:

- Steel karabiners rated with the same strength, oval geometry and screw-gate closing mechanism in accordance with EN 362 (type Q), EN 12275 (type Q), UIAA 121 or equivalent standards. These parts are eligible for installation without an EASA Form 1.
- Fuel cylinder straps, from any other TC holder for the equivalent cylinder mass.
- Pilot restraints (not the attachment in the basket floor) consisting of climbing equipment, including industrial work safety harnesses, in accordance with EN 12277, EN 361 for harnesses and EN 958:2017 for the energy absorber, or equivalent standards. The length of the connecting bridle has to be adjustable according to the size of the user. Modifications to the equipment are prohibited. These parts are eligible for installation without an EASA Form 1.
- Control cords from any other TC holder (not applicable to gas balloons certified for flammable lifting gas).
- Burner rods fabricated to the original dimensions and materials. This part is eligible for installation without an EASA Form 1.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

Any airworthiness limitations defined by the TC holder apply.

The modification of parts/equipment is not permitted.

This SC is not applicable to tethered gas balloons.

**5. Manuals**

Amend the AFM with an AFMS that contains or references the parts/equipment instructions for the specific operation, as required.

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

**6. Release to service**

This SC may be released by the pilot-owner subject to compliance with point M.A.801 of Regulation (EU) No 1321/2014 and in accordance with AMC M.A.801 or AMC1 ML.A.801, as applicable.

## Standard Change CS-SC101c

### INSTALLATION OF EMERGENCY LOCATOR TRANSMITTER (ELT) EQUIPMENT / SATELLITE PERSONAL LOCATOR BEACON

#### 1. Purpose

Installation or exchange of ELT equipment. This SC does not include the installation of antennas.

#### 2. Applicability/Eligibility

Aeroplanes with a MTOM below 2 730 kg, rotorcraft that are not being complex motor-powered aircraft, with a MTOM below 1 200 kg and with 4 ~~four or less~~ occupants or fewer, and any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contains acceptable data:

- FAA Advisory Circular AC 43.13-2B, ~~43-13-2B~~ Chapter 1 and 2.

Additionally, the following conditions apply:

- Instructions from the equipment manufacturer have to be followed.
- A position for the installation needs to be chosen that avoids shielding by carbon layers.
- It must be ensured that the equipment is installed in a way that, in case of a crash, it is unlikely that the antenna would be detached from the transmitter.
- The equipment is authorised in accordance with ETSO-C126a / ETSO-2C520 or later amendments, or equivalent standards.
- The ELT equipment is considered a passive device whose status is on standby until it is required to perform its intended function. As such, its performance is highly dependent on proper installation and post-installation testing. Guidance on this subject is contained in RTCA DO-182, *Emergency Locator Transmitter (ELT) Equipment Installation and Performance* or in Chapter 6 of EUROCAE ED-62A, *Minimum operational performance specification for aircraft emergency locator transmitters 406 MHz and 121.5 MHz (Optional 243 MHz)*.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

In the case of rotorcraft approved for NVIS, ~~if cockpit panels are to be inserted~~, the change cannot be considered a ~~an~~ SC.

#### 5. Manuals

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the Pilot-owner.

#### 7. Registration of the ELT

The ELT has to be registered in the national Cospas-Sarsat register in accordance with the procedures published by the State of Registry.

## Standard Change CS-SC102<sup>ab</sup>

### INSTALLATION OF DC POWER SUPPLY SYSTEMS (DC-PSSs) FOR PORTABLE ELECTRONIC DEVICES (PEDs)

#### 1. Purpose

Installation of DC power supply systems (DC-PSSs) which connect aircraft electrical power to portable electronic devices (PEDs).

#### 2. Applicability/Eligibility

Aeroplanes that are not being complex motor-powered aircraft, rotorcraft that are not being complex motor-powered aircraft, and any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-1B, Chapter 11, or ASTM F2639-18 or subsequent revisions; and
- ASTM F2490-20 or subsequent revisions (for electrical-load analysis).

Additionally, the following conditions apply:

- All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.
- Any modification of the electrical wiring is performed in accordance with acceptable practices such as the aircraft maintenance manual, or FAA Advisory Circular AC 43.13-1B, Chapter 11, or ASTM F2639-18 or subsequent revisions.
- The design of the DC-PSS and its installation shall:
  - provide circuit protection (e.g. circuit breakers) against system overloads, smoke and fire hazards resulting from intentional or unintentional systems shorts, faults, etc.;
  - provide a clearly labelled 'on/off ON/OFF switch' for deactivating the entire DC-PSS, which is easily accessible by the pilot-in-command in flight.
 

*Note:* The use of circuit breakers as switches is not acceptable, as it can degrade their protection function, except for switch-rated circuit breakers, provided that it is they are shown to be appropriately rated for the number of switch cycles expected during the service life of the systems or of the circuit breakers.
- The on/off ON/OFF switch is not mandatory for USB outlets, provided that the PED power supply cables are easily accessible in flight to be disconnected from the USB outlets at any time by the aircrew members.
- The socket installation shall be such as to prevent the ingress of fluid and also to minimise the possibility that conductive objects could be inserted into the socket.
- When installed in the cockpit, the DC-PSS shall not:
  - ~~the DC-PSS shall not~~ affect the proper operation of the magnetic direction indicator;
  - ~~the DC-PSS shall not~~ impair access to, or viewing or operation of cockpit controls or instruments; and
  - ~~the DC-PSS shall not~~ unduly impair the external view of the pilot.

**Note:** The positioning of the DC-PSS in the cockpit should also consider the possible hazard that would result from dangling power cables interfering with any emergency escape means and the access or view of the cockpit controls or instruments.

- If there are systems or equipment powered from the essential power supply ~~supplied systems or equipment~~, i.e. systems or equipment necessary for continued safe flight and landing; then:
  - the DC-PSS shall be powered from a non-essential supply (bus bar) of the aircraft;
  - an electrical load analysis ~~(ELA)~~ or electrical measurements shall be undertaken, taking into account the maximum loading that may be utilised from the PSS for PEDs, to substantiate that the ~~aeroplane's~~ aircraft's electrical power generating system has sufficient capacity to safely provide the maximum amount of power required by the PSS for PEDs. This assessment shall be recorded, or referred to, in ~~the~~ EASA Form 123; and
  - ~~A~~ After installation, a full aircraft EMI test shall be performed in accordance with FAA Advisory Circular AC 43.13-1B, Chapter 11, or ASTM F2639-18 or subsequent revisions.
- The equipment is ~~qualified~~ suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.;
- ~~The~~ Instructions and tests defined by the equipment manufacturer shall be followed.

#### 4. Limitations

This SC does not cover the approval of the use of ~~PEDs~~ ~~portable electronic devices~~. The responsibility ~~of~~ for establishing the suitability of use of PEDs on an ~~aeroplane~~ aircraft model remains with the operator/pilot-in-command.

This SC only allows the installation of a DC-PSS with a maximum power supply per outlet limited to 20 watts.

Any limitation defined by the equipment manufacturer applies.

#### 5. Manuals

If needed, amend the AFM with an AFMS that contains equipment instructions for operation, including the maximum load that can be connected to the DC-PSS, as required.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the ~~P~~ pilot-owner.

## Standard Change CS-SC104<sup>ab</sup>

### INSTALLATION OF LIGHTWEIGHT IN-FLIGHT RECORDING SYSTEMS

#### 1. Purpose

This SC covers **the** inside installations of lightweight in-flight recording systems. Lightweight in-flight recording systems record flight data, cockpit audio or cockpit images, or a combination **of them** ~~thereof~~, in a robust recording medium primarily for the purposes of operational monitoring, training, and incident analysis. They may also provide valuable data in the case of an accident investigation.

The installation of additional batteries is not covered by this SC.

This SC does not cover the installation of external antennas (see CS-SC004<sup>()</sup>), which may be applied concurrently).

This SC is not suitable for deployable<sup>25</sup> equipment.

**This SC cannot be used to install required equipment, as defined in the EASA Basic Regulation, e.g. required for the assessment of the type design, or by operating rules.**

*Note:* ~~Lightweight~~ in-flight recording systems may encompass **the** information collection and monitoring systems specified in ~~CS-ETSO-2C197~~~~2C-197~~. However, in-flight recording systems are not required to be compliant with ~~CS-ETSO-2C197~~~~2C-197~~.

#### 2. Applicability/Eligibility

Aeroplanes **that are** not ~~being~~ complex motor-powered aircraft, rotorcraft **that are** not ~~being~~ complex motor-powered aircraft, and any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B Chapter 2 for any eligible aircraft<sup>;</sup> or
- ~~F~~for ELA2, CS-SC403<sup>()</sup> ~~a~~ if the equipment is self-contained, has internal batteries and no external wiring.

Additionally, the following **conditions** apply<sup>ies</sup>:

- **All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.**
- The equipment is ~~qualified~~ **suitable** for the environmental conditions to be expected during normal operations<sup>;</sup> **see CS STAN.42 in Subpart A for guidance.**<sup>;</sup>
- The equipment relies exclusively on its own sensors, microphones, cameras and antennas for ~~getting~~ **obtaining** data and it has no data connection to the systems, instruments or sensors of the aircraft<sup>;</sup>
- If the equipment power supply does not rely on internal batteries, it meets the electrical requirements set **out** in Chapter 2 of FAA Advisory Circular AC 43.13-2B<sup>;</sup>
- A written statement made by the equipment manufacturer is available, confirming that:
  - the recording function of the equipment stores data on a non-volatile memory medium;
  - the memory used for recording is managed in **such** a way ~~such~~ that there is always sufficient memory space to record (e.g. circular recording);
  - only standard data compression is used, if any;

<sup>25</sup> As per EUROCAE ED-155 'Minimum Operational Performance Specification for lightweight flight recording systems', 'A deployable recorder is any robust recording system (ADRS, CARS or other) which is designed to be automatically separated from the aircraft only in the event of an accident.'

- no data encryption is used;
- appropriate documentation to decode the recorded data is provided ~~for free~~ to equipment owners ~~free of charge.~~;
- ~~The~~ instructions and tests defined by the equipment manufacturer are followed.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

The maximum ~~weight~~ mass of the equipment does not exceed 300 g.

The equipment ~~of the~~ installation cannot be used to extend the operational capability of the specific aircraft or to give credit for meeting ~~the requirement for a-flight recorder carriage~~ requirement.

#### 5. Manuals

Amend ~~the~~ AFM with ~~an~~ AFMS ~~that~~ contains ~~ing~~ or references ~~ing~~ the equipment instructions for operation, as required.

Amend ~~the~~ ICAs to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for ~~the~~ release to service ~~of the aircraft~~ by the ~~P~~pilot-owner.

## Standard Change CS-SC105~~ab~~

### INSTALLATION OF MOUNTING SYSTEMS TO HOLD EQUIPMENT

#### 1. Purpose

This SC is for the installation of ~~‘mounting systems’~~ that are intended to hold pilots’ equipment inside the cockpit or the cabin. This SC only addresses the mechanical installation **of mounting systems**.

*Note:* This SC does not apply to **handheld**~~hand-held~~ carry-on cameras, nor to devices worn by the pilot, e.g. helmet-mounted cameras.

#### 2. Applicability/Eligibility

This SC is applicable to **any** ELA2 **aircraft, excluding rotorcraft**~~aeroplanes~~.

#### 3. Acceptable methods, techniques, and practices

For the purposes of this SC, the following definitions apply:

- ‘installer’ means the person ~~that~~~~who~~ releases the aircraft to service **(and that carries out this SC)** in accordance with AMC M.A.801 **or AMC1 ML.A.801, as applicable**~~(and who carries out this SC)~~;
- ‘mounting system’ means the structural provisions such as suction mounts, brackets, clamps or any attachments which are fastened or bonded and installed in the aircraft through this SC;
- ‘equipment’ means the equipment that is used and installed by the pilot on the mounting system defined above in accordance with the data established and released by the installer; and
- ‘unit’ means the ~~‘equipment’~~ plus the ~~‘mounting system’~~.

Installation conditions:

- **All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.**
- If the unit is fitted in or near the cockpit, it must not interfere with any cockpit controls, nor obstruct the pilot’s view of the instruments, or the pilot’s external view, and it must not cause a distraction **to the pilot**.
- The mounting system must be installed on one of the fixed surfaces of the aircraft, i.e. not on any control system components that are subject to motion. There must be no interference with the flight controls.
- Where brackets, clamps and/or attachments are used, care must be taken to ensure that they do not damage the aircraft structure that carries flight loads.
- If existing airframe structural fastener locations are picked up, then any additional installed brackets of the mounting system should be of the same material as the underlying structure, and the new attachment bolts will need to be of sufficient length to maintain safety and to maintain suitable thread engagement and protrusion. However, it should be ascertained that no external or internal parts or systems, including the flight controls, could be fouled or obstructed by employing longer fasteners. Note that no part of the mounting system should be introduced that acts as a packer between any major load paths, e.g. where a bracket would act as a washer under the bolt head or nut, the size of the bolt should be taken into consideration, and all ~~disturbed~~**affected** fasteners must be inspected prior to the release to service of the aircraft by the installer.

- If suction mounts are used inside the cockpit or cabin, a suitable secondary retaining lanyard or strap should be attached to the unit to prevent any damage or a control jam if the primary suction mount becomes detached.
- The equipment that is mounted on the holding structural provisions in occupied areas should be installed so as to meet the requisite crash load requirements so that they will not detach, or become loose and cause injury to the occupants during operation or in the event of an emergency landing.
- For suction mountings, the primary suction mounting and secondary lanyard/strap should be assessed so that each is independently capable of carrying the load **of the equipment**.
- Push/Pull test requirement: the equipment should be weighed prior to installation and checked to ensure that the total unit mass does not exceed 300 g. Installers are advised to record the mass of the mounting system in a visible area.
- In order to check the security of the mounting system in flight, ground and emergency landing cases, a spring balance or another suitable method should be used to independently apply loads to the mounted unit of at least:
  - 9 times the weight of the unit forwards,
  - 4.5 times the weight of the unit upwards,
  - 6 times the weight of the unit downwards,
  - 3 times the weight of the unit to port,
  - 3 times the weight of the unit to starboard.

Loading should be applied for at least 3 seconds with no failures, damage or permanent deformation. Higher load factors should be considered ~~to be~~ appropriate for aerobatic use and should include a downwards case of 9 times the weight of the unit.

- When a suction mount is used, pull testing should be used to confirm the integrity of the secondary retention to at least 10 times the weight of the unit. Periodic rechecking of the primary mount integrity is advised.
- Proprietary self-adhesive mounts can be used in accordance with the manufacturer's instructions provided that they are capable of passing the pull tests. **The** installation of a secondary independent lanyard/strap retention feature may also be considered ~~to be~~ prudent when using these types of mounts.

Additionally, the following considerations apply:

- As part of applying this SC, the installer shall:
  - define and record the locations where the mounting systems can be installed on the individual aircraft, ensuring that the installation does not impede the rapid evacuation of the **aircraft occupants**; and
  - list the acceptable and tested mounting systems, their weights, and the part numbers or other means by which they are identifiable.
- In the particular case of balloons ~~and rotorcraft~~, pull tests shall **be performed**:
  - ~~be performed~~ on all locations where a camera can be installed; and
  - ~~be performed~~ in all possible landing directions, including vertically downwards (-z).

— No items with sharp edges shall be installed in close proximity to the head of any occupant.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

The total mass of the unit shall not exceed 300 g.

#### 5. Manuals

Amend the AFM **with an AFMS that contains or** ~~to~~ references the instructions for operation and the mass of the mounting system, as required.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required. There is a concern that self-adhesive mounts may be subject to environmental deterioration, especially for installations that are used over long periods. Therefore, periodic inspections ~~of~~ the whole mounting system shall be mandated, and if there are signs of deterioration, a pull test of the strength and integrity of the unit shall be performed. Parts that show signs of deterioration must be rectified or replaced.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

*Note:* Any mounting of an installation on the aircraft in accordance with the AFM/AFMS is not considered ~~to be~~ a maintenance action according to Part-M, and does not require a release to service.

## Standard Change CS-SC106~~a~~<sup>b</sup>

### INSTALLATION OF FLIGHT-TIME RECORDERS

*Note:* Flight-time recorders record the flight time, engine time, take-offs and landings, or a combination of them, for the purpose of creating logbook entries, and for accounting. Flight-time recorders that are subject to this SC are not required to ~~be in compliance~~ with ETSO-2C197 or equivalent standards.

~~Subject to the conditions of point 21.A.307(c) of Annex I (Part 21) to Regulation (EU) No 748/2012, they may be installed without EASA Form 1.~~

#### 1. Purpose

This SC is for the installation of flight-time recorders without affecting any aircraft systems or installing any new data acquisition points.

The installation of additional batteries is not covered by this SC.

This SC does not cover the installation of external antennas (see CS-SC004<sup>(1)</sup>, which may be applied concurrently).

#### 2. Applicability/Eligibility

This SC is applicable to **any** ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards ~~contains~~ acceptable data:

- FAA Advisory Circular **AC 43.13-2B, 43-13-2B** Chapters 1, 2, 11 and 12, or ASTM F2639-18 or subsequent **revisions**.

Additionally, the following conditions apply:

- **All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.**
- The design of the equipment installation must take into account crashworthiness, the arrangement and visibility of the installation, any interference with other equipment, the jettison of the canopy, and the emergency exit.
- The design of the equipment installation must take into account the structural integrity of the instrument panel or any other attachment point. Special consideration is necessary for equipment that is installed in a location behind the occupant(s).
- Data bus/data connectivity between the flight-time recorder and any other equipment that is ETSO-~~authorized~~ or approved in accordance with point 21.A.305 is not allowed.
- The equipment is **qualified suitable for** the environmental conditions to be expected during normal operations; **see CS STAN.42 in Subpart A for guidance.**
- **The** ~~instructions~~ and tests defined by the equipment manufacturer have to be followed.
- Perform an EMI test to assess any interference ~~of~~<sup>by</sup> the flight-time recorder with other systems, provided that the flight-time recorder emits transmissions during flight.
- The mounting system may be installed **in accordance with** ~~by following the provisions of~~ CS-SC105<sup>(1)</sup>.

*Note:* Lightweight in-flight recording systems may encompass the information collection and monitoring systems that are specified in ETSO-2C197. However, in-flight recording systems are not required to be compliant with ETSO-2C197.

#### 4. Limitations

Any limitations defined by the manufacturer of the flight-time recorder apply.

The flight-time recorder cannot be used as a substitute for the logbook record requirements that are mandated by Commission Regulation (EU) No 965/2012<sup>26</sup> (i.e. point CAT.GEN.MPA.180) and Commission Regulation (EU) No 1178/2011<sup>27</sup> (e.g. i.e. points CAT.GEN.MPA.180, FCL.130.S, FCL.710, FCL.720 and FCL.135.A).

GSM, UMTS, LTE, or similar transmission functions whose output power is unknown or is greater than 100 mW shall be switched off during flight.

The embodiment of this SC cannot must not affect any other aircraft systems or involve the installation of any new data acquisition points.

#### 5. Manuals

Amend the AFM with an AFMS that contains or references the equipment instructions for operation and any reference to the applicable limitations (refer to point paragraph 4 above), as required.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

<sup>26</sup> Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R0965&from=EN>).

<sup>27</sup> Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 311, 25.11.2011, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1524553458669&uri=CELEX:02011R1178-20160408>).

## Standard Change CS-SC107<sup>ab</sup>

### INSTALLATION OF CARBON MONOXIDE (CO) DETECTORS

#### 1. Purpose

This SC is for the installation of CO detectors, either as panel-mounted **active** devices or by a semi-permanent installation of **a passive** ‘lifesaver’ badges by the use of adhesives.

The exchange of CO detectors that were installed as part of the type design or other approved installations is not covered by this SC.

*Note 1:* If the installation requires additional brackets, please also refer to CS-SC105(), which may be applied concurrently.

*Note 2:* CO is a toxic, odourless and tasteless gas produced by the incomplete combustion of fossil fuels. Dangerous levels of CO can be produced by internal combustion engines or by any poorly vented or improperly adjusted fuel-burning appliances. Exposure to CO may cause sickness, headaches, or even death. CO detectors can save a pilot’s life.

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes and to rotorcraft that are not complex motor-powered aircraft, and to any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

For the purposes of this SC, the following definitions apply:

- ‘installer’ means the person **that who** releases the aircraft to service **(and that carries out this SC)** in accordance with AMC M.A.801 or AMC1 ML.A.801, as applicable ~~(and who carries out this SC);~~
- ‘panel-mounted’ means that **free places on the ‘spare, free’ panel holes** in the cockpit are used for the mounting **of CO detectors without blocking the visibility of other instruments;**
- ‘unit’ means the ~~‘detector’~~ plus the ~~‘mounting system’~~.

Installation conditions:

- **All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.**
- **The units need to be checked to ensure that their intended use fits into the envelope of the aircraft.**
- ~~If the unit is fitted in or near the cockpit, it~~ **The installed** unit must not interfere with any cockpit controls, and **must** not obstruct the pilot’s view of the instruments, or the pilot’s external view, or cause a distraction **to the pilot.**
- The mounting system must be on **a the** fixed surfaces of the aircraft, i.e. not on any control system components that are subject to motion. ~~There must be no interference with the flight controls.~~
- Where brackets, clamps and/or attachments are used, care must be taken to ensure that they do not damage the aircraft structure that carries flight loads.
- The equipment that is mounted on the holding structural provisions, other than for CO badges in occupied areas, should be installed so as to meet the requisite crash load requirements so that the equipment will

not detach or become loose and cause injury to the occupants. For such installations, CS-SC105**ab** should be followed, including the push/pull test requirements.

- The equipment manufacturer's installation instructions and testing provisions, if any, have to be followed.
- For self-adhesive CO badge detectors:
  - as they **are** normally ~~are~~ required to be replaced after a certain time in operation, the installation of a backplate is recommended, as the adhesive may interfere with the aircraft structure; and
  - the installer should record, **or refer to**, the expiry date of the detector, if any, **on the badge, and** in EASA Form 123**7**, or in the technical logbook.
- **For active CO detectors:**
  - **the connection to the electrical bus must be made using appropriate circuit breakers and wiring;**
  - **after the installation, an EMI test needs to be performed and passed.**

Additionally, the following considerations apply:

As part of applying this SC, the installer shall:

- define and record the location of the CO detector on the aircraft; and
- list the acceptable and tested mounting system, its **mass**~~weight~~, and if it is not a CO badge, the part number or similar identification.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

The maximum mass of the unit shall not exceed 300 g.

#### 5. Manuals

Amend the AFM **with an AFMS that contains or** ~~to~~ references **the** operating instructions and the mass of any panel-mounted **CO** detectors, as required.

Amend the ICAs in order to **establish**:

- ~~establish~~ recurrent inspections to monitor the condition of the unit by checking the integrity and security of the mounting system; **P** parts that show signs of deterioration must be rectified or replaced; and
- ~~establish~~ discard intervals if they are required by the manufacturer.

#### 6. Release to service

The first installation of a CO detector is not suitable for **the**~~a~~ release to service of the aircraft by the pilot-owner.

A pilot-owner can replace CO detector **or ion** badges by following the AFMS instructions.

## Standard Change CS-SC108a

### EXCHANGE OF HANDHELD FIRE EXTINGUISHERS FOR HALON-FREE TYPES

#### 1. Purpose

This SC is intended to allow the exchange of handheld fire extinguishers (e.g. halon based) for handheld fire extinguishers that contain halocarbon-free agents.

#### 2. Applicability/Eligibility

This SC is applicable to:

- aeroplanes and rotorcraft that are not complex motor-powered aircraft accommodating up to 6 passengers and with non-pressurised vessels;
- ELA2 aircraft accommodating up to 6 passengers and with non-pressurised vessels.

#### 3. Acceptable methods, techniques, and practices

The following standard contains acceptable data:

- FAA Advisory Circular AC 20-42D, *Hand Fire Extinguishers for use in Aircraft*.

Additionally, the following conditions apply:

- The instructions from the equipment manufacturer have to be followed.
- The equipment is authorised in accordance with ETSO-2C515 *Aircraft Halocarbon Clean Agent Hand-Held Fire Extinguishers*, or equivalent standards.
- The rating (type of fires) of the new fire extinguisher shall be at least equivalent to the rating of the fire extinguisher being replaced.
- The supporting structure of the replaced fire extinguisher shall be used to accommodate the new one. Therefore, the new fire extinguisher shall be of similar dimensions, shape and weight, within a 10 % variation.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

#### 5. Manuals

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC109a

### INSTALLATION OF HANDHELD FIRE EXTINGUISHERS

#### 1. Purpose

This SC is for the installation of handheld fire extinguishers on aircraft originally certified without handheld fire extinguishers.

The exchange of handheld fire extinguishers is covered in CS-SC108().

#### 2. Applicability/Eligibility

This SC is applicable to:

- aeroplanes that are not complex motor-powered aircraft accommodating up to 6 passengers and with non-pressurised vessels;
- ELA2 aircraft accommodating up to 6 passengers and with non-pressurised vessels, except rotorcraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 20-42D *Hand Fire Extinguishers for use in Aircraft*;
- FAA Advisory Circular AC 43.13-2B *Acceptable Methods, Techniques, and Practices - Aircraft Alterations*.

Additionally, the following conditions apply:

- The instructions from the equipment manufacturer have to be followed.
- The equipment is authorised in accordance with ETSO-2C515 *Aircraft Halocarbon Clean Agent Hand-Held Fire Extinguisher*, or equivalent standards.
- The minimum rating of the fire extinguisher shall be U.S.-UL 2B:C or equivalent ratings.
- Location and configuration:
  - The fire extinguisher must be accessible to the pilot and should not interfere with the pilot's view or with the operation of other systems. Therefore, only the following locations are allowed:
    - Locations foreseen by the aircraft manufacturer for that purpose, with structural provisions.
    - Within a cupboard or bin (conspicuously marked to identify its content and facilitate the removal of the equipment). Unless there is a partition to protect the equipment, a placard should be placed on the stowage compartment that contains the equipment. Such a placard should preclude damage to the equipment and the possibility of the equipment being hidden by other articles placed in the compartment. An example of placard contents is: 'For soft articles only', 'No stowage', or 'Emergency equipment only'.
    - In front of the pilot seat, or if easily reachable, of the co-pilot seat. Not interfering with the seat, pedal or any other equipment or control system, for their full range of operation.
    - Behind the pilot seat. Reachable without turning (and not interfering with the seat).

- The fire extinguisher should be provided with a quick-release latch (preferably two) attached to a fitting(s).
- A placard in clear view of the pilot must be installed to indicate the location of the fire extinguisher.
- Attachment to the airframe:
  - The fire extinguisher mounting support must be attached by means of fasteners to a rigid, structural part of the airframe such as the structural floor (floor beams, seat tracks or floor panels) or a cupboard. The use of clamps, suction caps or adhesives is not acceptable. It is acceptable to attach the fasteners directly onto floor panels or cupboards made of metallic or composite laminates, or sandwich panels with facings at least 2 mm thick. For panels or facings thinner than 2 mm or made of wood, multiple attachments and a local reinforcement element must be used (sandwich inserts, stainless steel NASM 970C washers or an equivalent aeronautical part, or a doubler).
  - The installation on primary structure elements such as frames, spars or pressurised skins is not allowed.
  - Fasteners and their specifications must be as follows:
    - type as per FAA AC 43.13-2B item 108;
    - solid, with protruding heads;
    - minimum diameter of 5 mm;
    - the attachment installation must be performed with a minimum quantity of 4 fasteners, spaced as far apart as practicable, at a minimum of 4 times the hole diameter (D) between 2 fasteners, and with a minimum distance of  $2 \cdot D$  to the fitting or panel edge for metal, and  $2.5 \cdot D$  for composites or wood;
    - as far as practical, it is preferable to use existing holes;
    - the bottle must be installed horizontally for better retention, preferably parallel to the wing, and to minimise bending, as close to the airframe attachment as practically possible.
  - Specifications for the secondary retaining lanyard or strap (except if inside a bin or a cupboard):
    - a stainless steel wire of a minimum 2-mm diameter;
    - a minimum of 2 attachment points to the bottle and to the airframe (attached at a location different from the fasteners);
    - slack allowing for just 1 finger width between the lanyard and the bottle.
- Check of strength and stiffness of the installation:
  - Apply to the fire extinguisher a force of 10 kg upwards, and then forwards or back, as practicable. After the application of the load, the fire extinguisher must remain attached to the supporting structure. A maximum elastic deformation of 2 cm is allowed.
  - Lanyards must be tested in the same way, with fasteners removed.

**4. Limitations**

Any limitations defined by the equipment or aircraft manufacturer apply.

This SC is limited to fire extinguishers of a maximum 2.5-kg mass.

**5. Manuals**

Amend the AFM with an AFMS that contains or references the equipment instructions for operation, as required.

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

**6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC110a

### INSTALLATION OF ANNUNCIATORS

#### 1. Purpose

This SC is for the installation of annunciators.

The installation of new warning, caution, or advisory lights is also covered by this SC.

This SC addresses the following configurations:

- Configuration 1: installation or replacement of a single annunciator;
- Configuration 2: installation or replacement of an integrated annunciator that collects several dedicated annunciators in a single combined piece of equipment for VFR only;
- Configuration 3: installation or replacement of an integrated annunciator that collects several dedicated annunciators in a single combined piece of equipment for VFR at night or for IFR.

*Note:* It is possible to install several individual indicators using this SC Configuration 1 several times.

#### 2. Applicability/Eligibility

Aeroplanes that are not complex motor-powered aircraft, and any other ELA2 aircraft.

This SC can be used to install or replace a single annunciator or an integrated annunciator in the following cases:

- VFR installations (including VFR at night); or
- IFR aeroplanes,

under the conditions defined for each configuration.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2;
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions;
- ASTM F2490-20 or subsequent revisions (for electrical-load analysis).

Additionally, the following conditions apply for all configurations:

- All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- The instructions and tests defined by the equipment manufacturer have to be followed.
- Any modification of the electrical wiring is performed in accordance with acceptable practices such as the aircraft maintenance manual (AMM) or FAA Advisory Circular AC 43.13-1B, Chapter 11, or ASTM F2639-18 or subsequent revisions. Additionally, the design of the installation must provide circuit protection (e.g. circuit breakers) against system overloads, smoke and fire hazards resulting from intentional or

unintentional system shorts, faults, etc. The analysis shall substantiate that the aircraft's electrical power generating system has sufficient capacity to safely provide the maximum amount of power required by the single or integrated annunciator.

- In cases of installation/exchange of the annunciator(s), the annunciator(s) should provide an adequate level of information on the state or condition of the system(s) being monitored and/or connected.
- Acceptable guidance includes the following:
  - The new annunciator(s) shall conform to the specifications and installation requirements defined by the equipment manufacturer (that designed the system(s) to be monitored and/or connected).
 

*Note:* Such specifications generally include instructions for routing cables (to avoid interference) as well as interface standards (e.g. RS232, ARINC, etc.).
  - The new annunciator(s) shall be powered from the same supply (bus bar) as the system which is being monitored.
  - The new annunciator(s) needs (need) to provide the same level of accessibility to the pilot as the removed annunciator(s). This does not preclude a new installation/arrangement and/or grouping of the annunciator(s). In the latter case, the locations recommended by the manufacturer of the system to be monitored and/or connected must be used.
  - When the manufacturer of the system(s) being monitored and/or connected does not provide human factors guidelines, the new annunciator(s) shall follow the following standard human factors practices:
    - if warning, caution, or advisory annunciators are exchanged, they must be:
      - red, for warning indications that require flight crew awareness and immediate flight crew response;
      - amber, for caution indications that require immediate flight crew awareness and subsequent flight crew response;
      - green, for safe-operation indications;
    - any other annunciator exchanged in the cockpit should be of any other colour, including white; the selected colours must differ sufficiently from the colours used for warnings, cautions, and advisories to avoid possible confusion.

Aggregated annunciators in Configuration 2 cannot replace required annunciators. Aggregated annunciators in Configuration 2 may duplicate required annunciators. Aggregated annunciators in Configuration 2 may complement the minimum warnings required for an aircraft.

The following additional conditions are applicable to Configuration 2:

- The new installation is based on a similar, previously certified installation. The equipment manufacturer or the approval holder declares that the new installation is similar to the previous installation and confirms its applicability, compatibility, conditions and limitations.
- The installation instructions from the equipment manufacturer shall be followed exactly. Compatibility between the integrated annunciator, the associated components and the installation is checked before starting the installation.

- An installation check flight is conducted to confirm proper functioning after installation, unless a ground test can adequately assess all the annunciations. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights.

*Note:* Typical repeaters include annunciators that gather data related to the fuel gauge, oil level gauge, volt meter, current meter, EGT, tyre pressure, < 30 minutes fuel, carburettor ice, canopy status, high altitude, low and high rpm, etc.

The following additional requirements apply to Configuration 3 for an integrated annunciator, also known as annunciation control unit (ACU):

- The integrated annunciator must be authorised according to an ETSO specification compatible with the systems to be monitored/connected or equivalent standards (as declared in the compatibility instructions from the manufacturer of the system(s) to be monitored/connected).
- The installation of the integrated annunciator together with the related parts has been already certified by EASA. This is denoted as a 'reference installation'. The equipment manufacturer or the approval holder declares that the new installation is similar to previous installations and confirms applicability, compatibility, conditions and limitations.
- Compatibility between the integrated annunciator, the associated components and the installation is checked before starting the installation.
- An installation check flight is conducted to confirm proper functioning after installation, unless a ground test is adequate to assess all the annunciations. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights.

#### **4. Limitations**

Any limitation defined by the equipment manufacturer applies.

The installation of the equipment cannot be used to extend the operational capability of the specific aircraft (e.g. from VFR to IFR).

The equipment installation can only be used to replace an existing annunciator or install an annunciator that aggregates aircraft warnings for awareness only in Configurations 1 and 2.

#### **5. Manuals**

Amend the AFM with an AFMS that contains instructions for operation, as required.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required. In particular, consider the description of the required maintenance actions after a partial or total failure of an integrated annunciator.

#### **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC152<sup>b,c</sup>

### CHANGES TO SEAT CUSHIONS, INCLUDING THE USE OF ALTERNATIVE FOAM MATERIALS

#### 1. Purpose

This SC is for the installation of alternative materials in the construction of seat cushions. For the refurbishment of seats with new seat cushions, alternative foam materials can be used.

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes and to rotorcraft that are not complex motor-powered aircraft, and to any ELA2 aircraft.

This SC is not applicable for installations in/on dynamically tested seats (according to CS 23.562, CS 23.2270 or equivalent **standards**).

*Note:* ~~In cases of uncertainty~~ **When in doubt**, check with the TC or STC holder.

#### 3. Acceptable methods, techniques, and practices

(a) The following standard contains acceptable data:

- FAA Advisory Circular AC 23-2A, Change 1.

(b) Seat cushions can be changed, including using new materials, under the following conditions:

- (1) The design of **the** exchange seat cushions should follow the geometrical dimensions of the original seat cushions.
- (2) If the geometrical dimensions are altered, it must be ensured that access to and egress from the seat will not be altered. On pilot seats, it must be ensured that the new cushion has no influence on the use of any of the controls.
- (3) The ~~'flame-resistant'~~ capability of the material installed on aircraft other than sailplanes, motor-powered sailplanes, LSAs, and balloons must be demonstrated. The ~~'flame-resistant'~~ capability can be demonstrated by:
  - (i) compliance with the ~~'flame-resistance'~~ requirements proven by means of FAA AC 23-2A Change 1 §8 b, or ~~the~~ equivalent **standards**, and documented by appropriate test reports released by the material suppliers; or
  - (ii) compliance with any other more stringent flammability tests (e.g. the vertical tests of FAR/CS-25 Appendix F); or
  - (iii) the successful execution of the following ~~'Flame Resistance'~~ test, referenced or recorded in EASA Form 123:

~~'Flame Resistance'~~ test

- (A) Test specimens. Three specimens, approximately **100 mm (4 inches)** wide and **355 mm (14 inches)** long, should be tested. Each specimen should be clamped in a metal frame so that the two long edges and one end are held securely. The frame should be such that the exposed area of the specimen is at least **50 mm (2 inches)** wide and **330 mm (13 inches)** long, with the free end at least **12 mm (0.5 inches)** from the end of the frame for ignition purposes. In the case of fabrics, the direction of the weave that

corresponds to the most critical burn rate should be parallel to the 355-mm (14-inch) dimension. A minimum of 250 mm (10 inches) of the specimen should be used for timing purposes, and approximately 40 mm (1.5 inches) should burn before the burning front reaches the timing zone. The specimen should be long enough so that the timing is stopped at least 25 mm (1 inch) before the burning front reaches the end of the exposed specimen.

- (B) Test procedure. The test specimens should be supported horizontally, and tested in draught-free conditions. The surface that will be exposed, when installed in the aircraft, should face downwards for the test. The test specimens should be ignited by a Bunsen or Tirrill burner. To be acceptable, the average burn rate of the three test specimens must not exceed 100 mm (4 inches) per minute. Alternatively, if the test specimens do not support combustion after the ignition flame is applied for 15 seconds or if the flame extinguishes itself and subsequent burning without a flame does not extend into the undamaged areas, the material is also acceptable. (Federal Specification CCC-T-191b, Method 5906, may also be used for testing materials of this type, but the material should not exceed the above-mentioned 100-mm (4-inches)-per-minute burn rate.)

To improve occupant safety, it is recommended to use energy-absorbing foams in the construction of seat cushions. Energy-absorbing foam materials have the potential to reduce the possibility of spinal injuries in cases of hard landings or minor crash landings.

#### 4. Limitations

N/A/a

#### 5. Manuals

N/A/a

#### 6. Release to service

This SC may be released by the pilot-owner subject to compliance with point M.A.801 or ML.A.801 of Regulation (EU) No 1321/2014 and in accordance with AMC M.A.801 or AMC1 ML.A.801 as applicable, in the case of sailplanes, including powered sailplanes.

## Standard Change CS-SC202<sup>b</sup>c

### USE OF AVIATION GASOLINE (AVGAS) UL 91

#### 1. Purpose

Unleaded Avgas UL 91 (according to ASTM D7547 or Def Stan 91-90) may be used if approved for the particular engine types and the installation at the aircraft level is already approved for operation with conventional Avgas or Motor Gasoline (Mogas).

Avgas UL 91 may also be used in all engines and aircraft types approved for use with Mogas RON 95 (MON 85) in accordance with Standard EN 228.

Even if approved for the engine, the operation with Avgas UL 91 is a modification at the aircraft level, and placards and manuals have to be amended, which could be done using this SC.

#### 2. Applicability/Eligibility

Aeroplanes other than complex motor-powered aircraft, and powered sailplanes with spark-ignited piston engines using Avgas or Mogas.

#### 3. Acceptable methods, techniques, and practices

To enable the use of unleaded Avgas UL 91 with this SC, the following conditions are to be met:

- the engine installed on the aircraft is approved for the use of unleaded Avgas UL 91 and the aircraft is already approved for operation with conventional Avgas (according to ASTM D910, Def Stan 91-90, Mil-G-5572, GOST1012-72 or equivalent standards) or Mogas; or
- the engine, as well as the aircraft, are approved for operation with Avgas Grade 80<sup>28</sup>; or
- the engine, as well as the aircraft, is approved for operation with Mogas RON 95 (MON 85) in accordance with Standard EN 228; and
- the installed engine has not been modified and meets the specifications of the original engine type certificate; and
- placards are installed/amended as needed to allow the use of the approved fuels.

#### Warning 1:

**The use of unleaded Avgas UL 91 in engines that have not been approved for its use may cause extensive damage to the engines or lead to in-flight failures due to the lower Motor Octane Number motor octane number (MON) of the fuel, compared to with Avgas 100LL.**

#### Warning 2:

**This SC is not intended for approving the use of automotive fuel.**

#### 4. Limitations

None.

<sup>28</sup> Operating limitations may specify grade 80 Avgas in various forms, including 'grade 80/87', '80 minimum', '80/87', '80', or '80 octane fuel or lower grades' as per FAA SAIB HQ-16-05R1 or later revisions.

**5. Manuals**

Amend the AFM with an AFMS that introduces ~~ing the~~ aircraft operation with unleaded Avgas UL 91.

**6. Release to service**

The ~~P~~pilot-owner may release the aircraft to service ~~the aircraft~~ after embodiment of this SC, subject to compliance with point M.A.801 or point ML.A.801 of Regulation (EU) No 1321/2014 and in accordance with AMC M.A.801 or AMC1 ML.A.801, as applicable.

## Standard Change CS-SC203<sup>b,c</sup>

### USE OF AVIATION GASOLINE (AVGAS) HJELMCO 91/96 UL AND 91/98 UL

#### 1. Purpose

Unleaded Avgas Hjelmc0 91/96 UL and 91/98 UL (meeting the requirements of MIL-G-5572 and ASTM D910 for grade 91/96 and 91/98 fuel (except of colour), as well as the requirements of ASTM D7547 and Def Stan 91-90) may be used if approved for the particular engine types, and the installation at **the** aircraft level is already approved for operation with conventional Avgas or ~~M~~motor ~~G~~gasoline (Mogas).

Avgas Hjelmc0 91/96 UL and 91/98 UL may also be used in all engines and aircraft types approved for use with Mogas RON 95 (MON 85) or RON 98 (MON 88) in accordance with Standard EN 228.

Even if approved for the engine, ~~the~~ operation with Avgas 91/96 UL or 91/98 UL is a modification at **the** aircraft level, and placards and manuals have to be amended. This could be done using this SC.

#### 2. Applicability/Eligibility

Aeroplanes other than complex motor-powered aircraft, and powered sailplanes with spark-ignited piston engines using Avgas or Mogas.

#### 3. Acceptable methods, techniques, and practices

~~Before releasing~~**To enable** the use of unleaded Avgas Hjelmc0 91/96 UL and 91/98 UL with this SC, the following conditions are to be met:

- the engine installed on the aircraft is approved for **the** use of unleaded Avgas 91/96 UL or 91/98 UL (or UL 91) and the aircraft is already approved for operation with conventional Avgas (according to ASTM D910, Def Stan 91-90, Mil-G-5572, GOST1012-72 or equivalent **standards**) or Mogas~~;~~ **or**;
- the engine~~,~~ as well as the aircraft~~,~~ **are** approved for operation with Avgas Grade 80<sup>29</sup>; or
- the engine, as well as the aircraft, is approved for operation with Mogas RON 95 (MON 85) or RON 98 (MON 88) in accordance with ~~s~~Standard EN 228; **and**
- the installed engine has not been modified and meets the specifications of the original engine ~~T~~type ~~C~~certificate; and
- placards are installed/amended as needed to allow the use of the approved fuels.

#### Warning 1:

**The ~~U~~use of unleaded Avgas 91/96 UL or 91/98 UL in engines that have not been approved for their use may cause extensive damage to the engines~~s~~ or lead to in-flight failures~~s~~ due to the lower ~~Motor Octane Number~~ **motor octane number** (MON) of the fuel, compared ~~to~~ **with** Avgas 100LL.**

#### Warning 2:

**This SC is not intended for approving the use of automotive fuel.**

<sup>29</sup> Operating limitations may specify grade 80 Avgas in various forms, including 'grade 80/87', '80 minimum', '80/87', '80', or '80 octane fuel or lower grades' as per FAA SAIB HQ-16-05R1 or later revisions.

**4. Limitations**

None.

**5. Manuals**

Amend **the** AFM with **an** AFMS **that** introduces **ing** the operation of unleaded Avgas Hjelmc0 91/96 UL and 91/98 UL (unless the use of Avgas UL91 is already approved).

**6. Release to service**

The pilot-owner may release **the aircraft** to service ~~the aircraft~~ after embodiment of this SC, subject to compliance with **point M.A.801 or point ML.A.801 of Regulation (EU) No 1321/2014 and in accordance with AMC M.A.801 or AMC1 ML.A.801, as applicable.**

## Standard Change CS-SC204ab

### INSTALLATION OF AN EXTERNALLY POWERED ENGINE PREHEATER

#### 1. Purpose

This SCchange is related to the installation of engine preheating systems that are externally powered and not connected to the aircraft electrical system. These preheating systems do not function during flight. The consideration with respect to the safety of flight is that the preheating system neither interferes with functional equipment nor comes loose or detached and creates some other flight hazard. The engine preheater is installed on a non-functional, non-hazardous basis.

#### 2. Applicability/Eligibility

Aeroplanes other than complex motor-powered aircraft, rotorcraft that are not being complex motor-powered aircraft, and piston-engine-powered sailplanes.

#### 3. Acceptable methods, techniques, and practices

The installation of the preheating system is in accordance with the installation instructions of the equipment manufacturer.

All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.

#### 4. Limitations

None.

#### 5. Manuals

Amend the AFM with an AFMS that explains the operation of the engine preheating system.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the Pilot-owner.

## Standard Change CS-SC206<sup>ab</sup>

### EXCHANGE OF FIXED-PITCH WOODEN PROPELLERS

#### 1. Purpose

This SC is for the exchange of a fixed-pitch wooden propeller for a similar fixed-pitch wooden propeller.

#### 2. Applicability/Eligibility

This SC is applicable to any ELA2 aircraft/aeroplanes with fixed-pitch wooden propellers.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- The propeller manufacturer's installation instructions and testing, if any, have to be followed.

Additionally, the following conditions apply:

- The number of blades, the mass, speed, diameter, gradient, twist, chord and tip shape, but also such main parameters as the centring hole, pitch circle diameter, and the number and diameter of the mounting bolts of the new propeller must be the same as those of the original propeller or must be permitted by the following Table 1 ~~Maximal tolerances~~ 'maximal tolerances' of the original propeller.

**Table 1 — Maximal tolerances**

Parameter	Tolerance	Remarks
Mass	± 10 %	
Rotational speed	+ 0 / - 50 rpm	
Diameter (R)	+0 / - 2 cm	Related to design data
Pitch	+ 0 / - 10 cm	
Chord, Twist	± 5 %	Each over the length of the propeller
Tip shape	Rounded or squared	Change from squared to rounded is allowed

**Table 1 — Maximal tolerances**

- The new propeller shall be type-certified by EASA, i.e. listed on the EASA Propeller Product List.
- A reissue of the noise certificate (EASA Form 45) by the competent authority is required.

The installer has to coordinate with the EASA ~~Noise Department~~ noise experts to ensure that the Noise Database is updated by sending the following information to [noise@easa.europa.eu](mailto:noise@easa.europa.eu):

- the designation of the propeller,
- its diameter, and
- its pitch.

On EASA Form 45, state under 'Remarks': 'Propeller similarities demonstrated in accordance with CS-SC206a.'

#### 4. Limitations

Any limitations defined by the propeller manufacturer apply.

**5. Manuals**

Amend the AFM with an AFMS that contains or references the operating instructions for the propeller, as required.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

**6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC207<sup>ab</sup>

### EXCHANGE OF THE FUEL CYLINDERS ON HOT-AIR BALLOONS

#### 1. Purpose

This SC is for the exchange of hot-air balloon fuel cylinders.

#### 2. Applicability/Eligibility

This SC is applicable to hot-air balloons as defined in ELA2, which are used in non-commercial operations.

#### 3. Acceptable methods, techniques, and practices

The following considerations apply:

- The new fuel cylinder must be part of an EASA-approved balloon type design.
- The installation must take into account the approved configuration in accordance with the respective FM.
- The installation must take into account any interference with other equipment.
- The design of the equipment installation must take into account the structural integrity of the attachment point. Therefore, the new fuel cylinder must be similar in length to, and not heavier than, the one that was originally approved.
- The owner is responsible for the continued airworthiness of the changed configuration, and the aircraft maintenance programme must be amended to include the new fuel cylinder(s).
- The equipment list must be amended in accordance with AMC M.A.801 or AMC1 ML.A.801, as applicable, to record the new fuel cylinder(s).

It is recommended to equip the fuel cylinders with quarter-turn ball valves as described in EASA SIB No.: 2018-14 *Use of Quarter-Turn Ball Valves on Liquid Gas Cylinders in Balloon Operations*<sup>30</sup>.

#### 4. Limitations

- The fuel cylinder must be accompanied by an EASA Form 1, or an equivalent airworthiness certificate, or be listed in the equipment list associated with a valid airworthiness review certificate.
- Any limitations defined by the fuel cylinder manufacturer apply.
- The new fuel cylinder must be compatible with the existing fuel hose connectors.
- Modifications to the fuel cylinder or the fuel system are not permitted.

#### 5. Manuals

The FM Supplement must, at least, contain:

- a description of the system, its operating modes and its functionality;
- the limitations and warnings;
- the normal and emergency operating procedures; and

<sup>30</sup> <https://ad.easa.europa.eu/ad/2018-14>

— the ICAs.

The instructions of **the** original equipment manufacturer for the exchanged fuel cylinder, for continued airworthiness, and for airworthiness limitations, remain applicable and must be applied.

**6. Release to service**

This SC may be released by the pilot-owner subject to compliance with **point M.A.801 or point ML.A.801 of Regulation (EU) No 1321/2014 and in accordance with** AMC M.A.801 **or AMC1 ML.A.801, as applicable.**

## Standard Change CS-SC208a

### INSTALLATION OF A MULTIFUNCTION DISPLAY FOR POWERPLANT INSTRUMENTS

#### 1. Purpose

This SC is for the installation of a multifunction display for powerplant instruments.

This SC covers the installation of equipment that is not already described in another specific SC.

This SC sets out two possible configurations:

- **Configuration 1:** The installation or exchange of an optional a multifunction display for powerplant instruments is not required by the aircraft certification basis.
- **Configuration 2:** The exchange of a a multifunction display for powerplant instruments replacing existing system(s) and/or sensor(s).

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes with a single piston engine, with a MTOM of less than 2 730 kg, and to any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2;
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions; and
- ASTM F2490-20 or subsequent revisions (for electrical-load analysis).

Additionally, the following conditions apply to Configurations 1 and 2:

- The installation of a a multifunction display for powerplant instruments, fuel flow/pressure instrument together with the related parts, has been certified on a similar aircraft by EASA or by a civil aviation authority of a third country that has entered into a bilateral agreement with the EU<sup>31</sup>. The equipment manufacturer has declared that the a multifunction display for powerplant instruments is suitable for installation on a specific aircraft and compatible with a specific engine type. Moreover, the equipment manufacturer provides the necessary design data to the installer.
- An electrical-load analysis or electrical measurements shall be undertaken, taking into account the maximum loading that may be utilised from the a multifunction display for powerplant instruments. The analysis shall substantiate that the aircraft's electrical power generating system has sufficient capacity to safely provide the maximum amount of power required by the a multifunction display for powerplant instruments. This assessment must be recorded, or referred to, in EASA Form 123.
- Installation instructions from the manufacturer or the approval holder are strictly followed. Compatibility between the a multifunction display for powerplant instruments, the associated components and the engine/installation must be checked before starting the installation.

<sup>31</sup> Refer to <https://www.easa.europa.eu/document-library/bilateral-agreements>.

*Note:* A typical engine monitoring system consists of a display, an electronic data converter and a set of probes, senders, transducers and interfaces that extract the engine parameters for subsequent display. This description is functional and does not define hardware units. The raw measured parameters (e.g. temperature, pressure, pulse signals) are acquired, processed and converted, as applicable, by the electronic data converter function. The data converter function outputs the parameters on a serial bus with the serial protocol appropriate for the display. These processed parameters are then directly displayed. In this context, compatibility is based on the combination of a display, an electronic data converter and a set of probes, senders, transducers and interfaces that are identical to the certified installation or explicitly declared compatible by the equipment manufacturer or the approval holder.

- The instructions and tests defined by the equipment manufacturer are followed; this includes in particular the compatibility of probes/senders/transducers/interfaces, wiring instructions, ground test, as well as calibration and configuration, as applicable.
- The calibration is performed according to the equipment manufacturer instructions.
- An installation check flight is conducted to verify calibration and accuracy. This installation check flight shall check that the instrument markings on the display are accurate according to the AFM or operating handbook for every function/parameter. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights.
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.

The following additional specific conditions apply to Configuration 1:

- All the parts used in Configuration 1 are eligible for installation without an EASA Form 1.
- Install a placard close to the a multifunction display for powerplant instruments to inform the pilot that this equipment is for awareness only.
- If the aircraft is already fitted with a primary instrument that provides at least one of the same parameters as the a multifunction display for powerplant instruments, install a placard close to the a multifunction display for powerplant instruments to inform the pilot to refer to the original instrument for primary information.

The following additional specific conditions apply to Configuration 2:

- The instrument is authorised according to each ETSO, or equivalent standards, applicable to each function embedded in the unit. The equipment manufacturer has declared that the a multifunction display for powerplant instruments is suitable for installation for the usage in Configuration 2, which includes the following specific requirements of Table 1.

**Table 1: Function with applicable conditions**

<b>Function</b>	<b>Applicable ETSO</b>	<b>Additional detailed declarations in the Declaration of Design and Performance or equivalent declarations</b>
Powerplant Fire Detection Instruments (Thermal and Flame Contact Types)	ETSO-2C11e	The software is declared as level D according to EUROCAE ED 12() or equivalent standard. The airborne electronic hardware is declared as level D.
Fuel Flowmeters	ETSO-C44c	The software is declared as level C according to EUROCAE ED 12() or equivalent standard. The airborne electronic hardware is declared as level C. Lightning/HIRF protection is declared appropriate for a level C system.
Pressure Instruments — Fuel, Oil and Hydraulic (Reciprocating Engine Powered Aircraft)	ETSO-C47a	The software is declared as level C according to EUROCAE ED 12() or equivalent standard. The airborne electronic hardware is declared as level C. Lightning/HIRF protection is declared appropriate for a level C system.
Electric Tachometer: Magnetic Drag (Indicator and Generator)	ETSO-C49b	The software is declared as level D according to EUROCAE ED 12() or equivalent standard. The airborne electronic hardware is declared as level D.
Fuel and Oil Quantity Instruments	ETSO-C55a	The software is declared as level C according to EUROCAE ED 12() or equivalent standard. The airborne electronic hardware is declared as level C. Lightning/HIRF protection is declared appropriate for a level C system.
Unit combining any two functions above	/	The software is declared as level C according to EUROCAE ED 12() or equivalent standard. The airborne electronic hardware is declared as level C. Lightning/HIRF protection is declared appropriate for a level C system.

- The instrument has the same minimum functionality as the removed unit, and is installed in a similar location.
- The markings on the indicators are similar (e.g. limits, operating ranges) to the markings that were required on the original instrument.

- The selection/calibration of the instrument must be such that, under the same conditions, the indications provided by the old and the new instrument are similar.
- The instructions and tests defined by the instrument manufacturer have to be followed.
- The instrument should provide the measurement of the related magnitude in the same units as the instrument for which it was exchanged, or in other units when such units are used in the AFM, and the related placards have been modified as necessary.

#### **4. Limitations**

Any limitations defined by the instrument manufacturer apply.

Any limitations of the existing installation remain valid.

The installation of the equipment cannot be used to extend the operational capability of the specific aircraft (e.g. from VFR to IFR).

#### **5. Manuals**

Amend the AFM with an AFMS that contains or references the operating instructions for the instrument, as required. For Configuration 1, add a limitation clarifying the following points:

- The a multifunction display for powerplant instruments shall only be used for awareness.
- The fuel flow/pressure indications must never be used as the primary indicator of the fuel quantity in the tanks.
- The pilot remains responsible for computing and managing the fuel.
- The fuel flow/pressure indications are to be used to check the pilot's fuel computations and to enhance the detection of engine issues.
- The pilot needs to check and configure the programmable settings before take-off.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC209a

### EXCHANGE OF A PROPELLER GOVERNOR

#### 1. Purpose

This SC is for the exchange of a propeller governor for another type that meets the same minimum standards and has the same settings and functions.

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes that are not complex motor-powered aircraft, and to any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following contains acceptable data:

- the installation and maintenance manual of the equipment manufacturer.

The propeller governor to be installed shall have the same settings as the previous one within the following limits (as applicable):

- maximum rpm for the governor  $\pm 10$  rpm;
- minimum governed rpm, which should be  $+0 / -300$  rpm;
- maximum relief valve pressure  $\pm 20$  PSI;
- working principle for oil pressure to increase or decrease the pitch;
- if applicable, feathering rpm  $\pm 20$  rpm;
- if applicable, the same synchronising system;
- minimum pump capacity that should be reached;
- direction of rotation CW or CCW facing the engine mounting pad;
- governor engine flange interface (e.g. AND20010).

Additionally, the propeller governor shall be accompanied by an EASA Form 1.

#### 4. Limitations

Any limitations defined by the propeller governor manufacturer apply.

#### 5. Manuals

Amend the AFM with an AFMS that contains or references the exchanged governor, together with the equipment instructions for operation, as required.

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

**6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC210a

### INSTALLATION OF A FUEL FLOW/PRESSURE INSTRUMENT

#### 1. Purpose

This SC is for the installation of a fuel flow/pressure instrument. A fuel flow/pressure instrument installed according to this SC does not alleviate the requirement for the pilot to compute the required fuel quantity during flight planning and monitor the fuel consumption in flight.

This SC sets out two possible configurations:

- **Configuration 1:** The installation or exchange of an optional fuel flow/pressure instrument is not required by the aircraft certification basis.
- **Configuration 2:** The exchange of a fuel flow/pressure instrument replacing the existing system(s) and/or sensor(s).

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes with a single piston engine, with a MTOM of less than 2 730 kg, and to any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2;
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions;
- ASTM F2490-20 or subsequent revisions (for electrical-load analysis).

Additionally, the following conditions apply to Configurations 1 and 2:

- The installation of the fuel flow/pressure instrument, together with the related parts (including transducers), has been certified by EASA or by a civil aviation authority of a third country that has entered into a bilateral agreement with the EU<sup>32</sup>. The equipment manufacturer has declared that the fuel flow/pressure instrument is suitable for installation on a specific aircraft and compatible with a specific engine type. Moreover, the equipment manufacturer provides the necessary design data to the installer.
- The installation instructions from the manufacturer shall be followed exactly. Compatibility between the fuel flow/pressure instrument, the associated components and the engine/installation must be checked before starting the installation.

*Note:* In this context, compatibility applies to all the installed parts; the equipment manufacturer or the approval holder declares such compatibility.

- An electrical-load analysis or electrical measurements must be undertaken, taking into account the maximum loading that may be utilised from the fuel flow/pressure instrument. The analysis must substantiate that the aircraft's electrical power generating system has sufficient capacity to safely provide

<sup>32</sup> Refer to <https://www.easa.europa.eu/document-library/bilateral-agreements>.

the maximum amount of power required by the fuel flow/pressure instrument. This assessment needs to be recorded, or referred to, in EASA Form 123.

- The instructions and tests defined by the equipment manufacturer must be followed; this includes, in particular, the compatibility of the fuel flow and pressure transducers, wiring instructions, ground test, as well as calibration and configuration, as applicable.

*Note 1:* The calibration might require a flight. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights. The calibration should be performed according to the equipment manufacturer instructions.

*Note 2:* The configuration of a fuel flow/pressure instrument typically includes but is not limited to the unit to be used for fuel quantity (e.g. US gallons, British gallons or litres). The configuration can also include the selection of different warnings according to the pilot's preferences.

- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.

The following additional specific conditions apply to Configuration 1:

- All the parts used in Configuration 1 are eligible for installation without an EASA Form 1.
- Install a placard close to the fuel flow/pressure instrument to inform the pilot to refrain from relying on this fuel flow instrument to determine the fuel levels in the tanks.
- If the aircraft is equipped with a primary fuel flow and/or pressure instrument, install a placard close to the fuel flow/pressure instrument to inform the pilot to refer to the original fuel flow/pressure instrumentation for primary information.

The following additional specific conditions apply to Configuration 2:

- The equipment manufacturer has declared that the fuel flow/pressure instrument is authorised according to the ETSO standard(s) applicable to each function provided by the instrument: ETSO-C44c, ETSO-C47a, ETSO-C55a or equivalent standards. The equipment manufacturer has declared that the fuel flow/pressure instrument is suitable for installation for the intended usage as defined with the additional detailed declarations in the declaration of design and performance below:
  - the software is declared as level C according to EUROCAE ED 12() or equivalent standards;
  - the airborne electronic hardware is declared as level C;
  - lightning/HIRF protection is declared appropriate for a level C system.
- The instrument has the same minimum functionality and is installed in a similar location as the removed unit.
- The indications have similar markings (e.g. limits, operating ranges) to the markings that were required on the original instrument.
- The selection/calibration of the instrument must be such that, under the same conditions, the indications provided by the old and the new instrument are similar.
- The instructions and tests defined by the instrument manufacturer have to be followed.

- The instrument should provide the measurement of the related magnitude in the same units as the instrument for which it was exchanged, or in other units when such units are used in the AFM, and the related placards have been modified as necessary.

#### **4. Limitations**

Any limitations defined by the instrument manufacturer apply.

Any limitations of the existing installation remain valid.

This SC cannot be used to install a primary fuel flow/pressure instrument. However, this SC can be used to install or replace a secondary fuel flow/pressure instrument for awareness only.

#### **5. Manuals**

Amend the AFM with an AFMS that contains or references the operating instructions for the instrument, as required.

For Configuration 1, add a limitation clarifying the following points:

- The fuel flow/pressure instrument shall never be used as the primary indicator of the fuel quantity in the tanks.
- The pilot remains responsible for computing and managing the fuel.
- The fuel flow/pressure instrument is to be used to check the pilot's computations for fuel and to enhance the detection of engine issues.
- The pilot must check and configure any programmable settings before take-off.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC251bc

### INSTALLATION OF AN ANGLE-OF-ATTACK (AoA) INDICATOR SYSTEM

#### 1. Purpose

This SC applies only to a supplemental AoA indicator system, not to the AoA system required for the aircraft type certification.

#### 2. Applicability/Eligibility

Sailplanes, including powered sailplanes and aeroplanes not considered complex motor-powered aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards and guidelines contain acceptable data:

- FAA Advisory Circulars AC 43.13-1B and AC 43.13-2B, or ASTM F2639-18 or subsequent revisions;
- ASTM F3011-13 standard, or FAA *Non Required Safety Enhancing Equipment (NORSEE)* approval (PS-AIR-21.8-1602), or FAA Memo AIR100-14-110-PM01.

*Note: as an alternative to the FAA approval letter referred to in the FAA Memo, Part 66 approved certifying staff may accept also a declaration of compliance with the ASTM F3011-13 standard issued by the manufacturer of the AoA to be installed.*

Additionally, the following conditions apply:

- all the parts and appliances identified in this SC are eligible for installation without an EASA Form 1;
- the installation of the system:
  - neither requires an interface with the pitot-static system nor relies on a direct pressure input from the pitot-static system; or
  - a pitot-static test needs to be performed in accordance with the aircraft maintenance manual (AMM);
- ~~— the installation of the system neither requires an interface with the pitot-static system nor relies on direct pressure input from the pitot-static system;~~
- the probe is located in such a way that it interferes neither with the functioning of the flight controls nor with the pitot-static system nor with the aircraft's stall warning system;
- the accuracy of stall indication coincides with the existing stall warning;
- the installed AoA indicator system shall not interfere negatively with previously installed stall warning or AoA systems;
- the installation of the probe is in a non-pressurised area, preferably on an inspection panel;
- the system is not used as an input source to any other system, such as an AFCS, stick pusher, envelope protection system or comparable function, unless certified separately;
- the installation and electrical wiring are installed in accordance with acceptable practices such as the aircraft maintenance manual (AMM), or FAA Advisory Circulars AC 43.13-1B and AC 43.13-2B, or ASTM F2639-18 or subsequent revisions;

- ~~The equipment is~~ qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance on compliance with environmental conditions; and
- the instructions and tests defined by the system manufacturer have to be followed.

#### 4. Limitations

The provided information is used in an advisory or supplementary manner (no hazard, no credit basis).

No operational credit may be taken for the installation, such as reduced stall speeds, reduced approach speeds, reduced take-off or landing distances, etc.

Any limitations defined by the AoA system manufacturer apply. Install the limitation placards, as required.

#### 5. Manuals

The AFMS shall, at least, contain:

- a description of the system ~~description~~, its operating modes and functionality;
- limitations, warnings and placards; and
- operating procedures.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for the release to service of the aircraft by the Pilot-owner.

## Standard Change CS-SC252a

### INSTALLATION OF A TACTILE STALL WARNING INDICATOR SYSTEM

#### 1. Purpose

This SC is for the installation of a tactile/kinaesthetic stall warning (e.g. stick vibrator) indicator system that complements an already fitted stall warning system.

#### 2. Applicability/Eligibility

Sailplanes, including powered sailplanes, and ELA2 aircraft except VLR.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2;
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.
- The tactile/kinaesthetic stall warning system must be activated by the signal that triggers a warning (visual and/or aural cue) indicating an imminent stall risk.
- The tactile/kinaesthetic stall warning system that slightly moves the control surfaces (e.g. stick vibrator) must be adjusted to prevent adverse effects upon the aircraft dynamics (e.g. the amplitude and frequency values of a stick vibrator).
- In order to minimise unforeseen nuisance alerts, the pilot must have the possibility to manually inhibit this tactile/kinaesthetic warning indicator system. The inhibition means must be readily accessible to the pilot, and catch the pilots' attention when inhibited.
- The following electrical conditions apply:
  - The installation meets the electrical requirements set out in Chapter 2 of FAA Advisory Circular AC 43.13-2B.
  - The installer verifies that the additional power consumption is compatible with the aircraft installation. The resulting electrical load for the aircraft on which the device is installed is recorded, or referred to, in EASA Form 123.
  - The installation provides circuit protection (e.g. circuit breakers) against system overloads, smoke and fire hazards resulting from intentional or unintentional system shorts, faults, etc.
  - If a non-essential supply (bus bar) exists, the warning indicator system is powered from this bus.
- The design and installation of the wiring are in accordance with the equipment manufacturer installation manual and with FAA Advisory Circular AC 43.13-1B.
- The a tactile/kinaesthetic stall warning exclusively relies on its own systems/units. Additionally, it is only connected to the following features from the existing installation: the power supply, trigger signal (see condition in the second (first-level) indent above) and the stick.

- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- The installation instructions and tests defined by the equipment manufacturer have to be followed.
- An installation check flight is conducted to assess whether the performance of the installation is adequate, unless a ground test can achieve the same objective. Refer to CS STAN.48 in Subpart A for additional guidance.

Such tests shall verify that the arrangement of the a tactile/kinaesthetic stall warning in the cockpit is suitable, and verify the electrical bonding as well as the correct functioning of all other equipment installed in the aircraft and the lack of interference (EMI/EMC) with other systems. FAA Advisory Circular AC 43.13-1B, Chapter 11, or ASTM F2639-18 or subsequent revisions, provides an acceptable means to perform an EMI/EMC test.

#### **4. Limitations**

The provided information is used in an advisory or supplementary manner (no hazard, no credit basis).

No operational credit may be taken for the installation, such as reduced stall speeds, reduced approach speeds, reduced take-off or landing distances, etc.

Any limitations defined by the system manufacturer apply. Install the limitation placards, as required.

This SC cannot be used to replace the basic stall warning system.

#### **5. Manuals**

The AFMS shall, at least, contain:

- a description of the system, its operating modes and functionality;
- limitations, warnings and placards;
- operating procedures.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required. Consider the need to regularly check for proper calibration and adjust it in case of negative feedback from the pilots.

#### **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC253a

### INSTALLATION OF A DEVICE THAT RECEIVES UPLINKED WEATHER RADAR INFORMATION

#### 1. Purpose

This SC is for the installation of a device that receives uplinked weather radar information, further designated as 'weather device'.

The installation may include an integrated antenna and/or an external antenna.

This SC does not cover the installation of external antennas (see CS-SC004(), which may be applied concurrently).

#### 2. Applicability/Eligibility

This SC is applicable to:

- aeroplanes that are not complex motor-powered aircraft;
- rotorcraft that meet all the following conditions:
  - have a MTOM of 3 175 kg or less;
  - are certified for a maximum passenger seating configuration of 9 passengers or fewer;
  - are limited to operate in VFR conditions;
  - are not approved for Category A (CAT A), or equivalent to CAT A, operations;
- any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B, Chapters 1 and 2;
- FAA Advisory Circular AC 43.13-1B, Chapters 10, 11 and 12, or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- All the parts and appliances identified in this SC are eligible for installation without an EASA Form 1.
- The maximum mass of the 'weather device is 300 g. For a mass slightly above 300 g, the installer shall assess the compatibility of the mounting instructions from the equipment manufacturer with the characteristics of the intended mounting location. The weather device is permanently installed, or it can use a mounting system that may be installed according to CS-SC105().
- The 'weather device can integrate a receiver within or outside the aeronautical frequency bands.
- The 'weather device may comprise an emitter; this emitter shall transmit outside the aeronautical frequency bands (meaning on frequencies allocated to aeronautical services in accordance with telecommunications regulations). Such emitter shall be located away from the aircraft instrument required for the flight to minimise the risk of interference. The installer shall follow any documented instruction for interference protection of any required equipment.
- The installation shall not obstruct the primary field of view of equipment essential for the safe operation of the aircraft.

- If the 'weather device is not exclusively powered by internal batteries, the following conditions apply:
  - The installation meets the electrical requirements set out in Chapter 2 of FAA Advisory Circular AC 43.13-2B.
  - The installer verifies that the additional power consumption is compatible with the aircraft installation. The results from the electrical-load analysis are recorded, or referred to, in EASA Form 123.
  - The installer follows the equipment manufacturer instructions for electrical protection.
  - If a non-essential supply (bus bar) exists, the 'weather device is powered from this bus.
- If the weather device contains lithium batteries, the equipment manufacturer has declared how the risks associated with internal lithium batteries, if any, were considered. Refer to CS STAN.47 in Subpart A for guidance.
- The design and installation of the wiring are in accordance with the equipment manufacturer installation manual and with FAA AC 43.13-1B.
- The weather device exclusively relies on its own systems/units.
 

Data bus connectivity between the 'weather device and other equipment, which is:

  - ETSO authorised (or equivalent authorisations);
  - required by the TCDS, AFM or POH; or
  - required by other applicable requirements such as those for operations and airspace,

is prohibited.
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- The installation instructions and tests defined by the equipment manufacturer have to be followed.
- For any antenna included in or installed on the 'weather device, any of the following means is acceptable:
  - the total mass of the antenna is included in the 300-g maximum limit; or
  - an external antenna can be installed according to CS-SC004().
- A ground test is conducted to assess whether the performance of the installation is adequate, unless an installation check flight is necessary to evaluate proper reception at different altitudes. Refer to CS STAN.48 in Subpart A for additional guidance on installation check flights.
 

Such tests shall verify that the arrangement of the 'weather device in the cockpit is suitable (in particular, no impairment of the pilot's view, absence of glare and reflections), verify the electrical bonding, as well as the correct functioning of all other equipment installed in the aircraft and the lack of interference (EMI/EMC) with other systems. FAA Advisory Circular AC 43.13-1B, Chapter 11, or ASTM F2639-18 or subsequent revisions, provides an acceptable means to perform an EMI/EMC test.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

This SC excludes the installation of weather RADARS.

In the case of aircraft that are approved for NVISs/NVGs, the change cannot be considered a SC.

This SC shall not include a transmitter in the aeronautical frequency bands (meaning on frequencies allocated to aeronautical services in accordance with telecommunications regulations). Any transmitter that transmits outside the aeronautical frequency bands must comply with the applicable telecommunications regulations. The operating manual must indicate any restrictions in the usage of related frequencies of use applicable to a specific country or continent.

## **5. Manuals**

Amend the AFM with an AFMS to include information stating 'For situation awareness only. Do not use the system to fly into adverse weather conditions.' or similar information, together with any necessary operating instructions, procedures or limitations. Add instructions for the proper use of weather data sources such as 'Weather radar information older than 15 to 20 minutes may not be used as current weather information.'

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required. In particular, provide a wiring diagram depicting the equipment installation.

## **6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC401~~ed~~

### INSTALLATION~~EXCHANGE~~ OF BASIC FLIGHT INSTRUMENTS

#### 1. Purpose

This SC is for the ~~exchange~~ installation of basic flight instruments for new equipment, and it is applicable to:

- airspeed instruments;
- turn and slip instruments;
- bank and pitch instruments;
- direction instruments;
- vertical velocity instruments;
- accurate time pieces (e.g. clocks); ~~and~~
- pressure-actuated altimeter instruments.

This SC does not permit the installation of digital multifunction displays ~~except for the following cases:~~

- ~~However,~~ a combination of turn and slip with bank and pitch in one display; ~~is acceptable~~
- a combination of a digital altimeter with auxiliary functions such as the control of a radio and/or transponder (loss of function and/or misleading information is minor in this case);
- the basic instrument is not required, as defined in the EASA Basic Regulation, e.g. required for the assessment of the type design, or by operating rules.

#### 2. Applicability/Eligibility

This SC is applicable to aeroplanes that are not complex motor-powered aircraft, to any ELA2 aircraft with a maximum flight altitude below FL 280, and to sailplanes, including powered sailplanes.

It is also applicable to rotorcraft that ~~are not complex motor-powered aircraft, which have a single engine, and which are limited to day VFR only~~ meet all the following conditions:

- have a MTOM of 3 175 kg or less;
- are certified for a maximum passenger seating configuration of 9 passengers or fewer;
- are limited to operate in day VFR conditions;
- are not approved for Category A (CAT A), or equivalent to CAT A, operations.

Additionally, in ~~in~~ the case of rotorcraft, if the instrument is to be connected to the AFCS, the change cannot be considered ~~to be an~~ SC.

#### 3. Acceptable methods, techniques, and practices

The following standards contains acceptable data:

- FAA AC 43.13-2B, Chapter 11, or ASTM F2639-18 or subsequent revisions.

Additionally, the following conditions apply:

- For eligible aeroplanes and rotorcraft for which the basic instrument is required, as defined in the EASA Basic Regulation, e.g. required for the assessment of the type design, or by operating rules:

- The SC is limited to exchange.
  - With the exception of clocks, the instrument is authorised according to the applicable ETSO or ~~the~~ equivalent standards. Clocks are eligible for installation without an EASA Form 1.
  - The instrument has the same functionality, is installed in the same location, and the display of information is consistent with the overall flight deck design philosophy.
- For eligible aeroplanes and rotorcraft for which the basic instrument is not required, as defined in the EASA Basic Regulation, e.g. required for the assessment of the type design, or by operating rules:
  - The installation of the equipment does not need the relocation of a required equipment, as defined in the EASA Basic Regulation, e.g. required for the assessment of the type design, or by operating rules.
  - The display of information is consistent with the overall flight deck design philosophy.
- The equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance.
- The instrument does not introduce any glare or reflections that could interfere with the pilot's vision. This condition applies to the instrument for all operations for which certification is requested.
- The indicators have the markings (e.g. limits, operating ranges) that were required on the original instrument.
- The selection/calibration of the instrument must be such that, under the same conditions, the indications provided by the old and the new instrument are the same.
- The instructions and tests defined by the equipment manufacturer have to be followed.
- The new instrument should provide the measurement of the related magnitude in the same units as the instrument for which it was exchanged, or in other units when such units are used in the AFM, and the related placards have been ~~updated~~ modified as necessary.

#### 4. Limitations

Any limitations defined by the instrument manufacturer apply.

Any limitations of the existing installation remain valid.

In the case of aircraft that are approved for NVIS/NVGs, ~~if cockpit panels are to be inserted~~, the change cannot be considered ~~to be an~~ SC.

#### 5. Manuals

For the installation of a basic flight instrument that is authorised according to the applicable ETSO or equivalent standards, Amend the AFM with an AFMS that contains or references the operating instructions for the instrument, as required.

For the installation of a non-required basic flight instrument that is also not authorised according to the applicable ETSO or equivalent standards, amend the AFM with an AFMS to include information stating 'Information to be used for situational awareness only' or similar information, together with any necessary operating instructions, procedures or limitations.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

**6. Release to service**

This SC is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Change CS-SC402bc

### INSTALLATION OF SAILPLANE EQUIPMENT

#### 1. Purpose

The installation of sailplane gliding equipment is considered as a 'standard part' in accordance with AMC 21.A.303(c)2.

In the context of this SC, 'standard part' means any of the following parts: (i.e.

- electrical variometers,
- ball-type bank/slip indicators ~~ball type~~,
- total energy probes,
- capacity bottles (for variometers),
- final glide calculators,
- navigation computers,
- data loggers,
- barographs, or
- cameras and bug wipers).

The installation of external antennas or additional batteries is not covered by this SC.

This ~~SC Standard Change~~ covers the installations of equipment which ~~is~~ are not already described in another specific ~~SC Standard Change~~.

#### 2. Applicability/Eligibility

Sailplanes, including powered sailplanes, as defined in ELA2.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-2B;
- ASTM F2639-18 or subsequent revisions, and ASTM F2490-20 or subsequent revisions (for electrical-load analysis).

Additionally, the following ~~applies~~ conditions apply:

- the design of the equipment installation must take into account crashworthiness, arrangement and visibility, interferences with other equipment, the ~~jettison of the~~ canopy ~~jettison~~ and the emergency exit;
- the design of the equipment installation must take into account the structural integrity of the instrument panel or any other attachment point; ~~—S~~ special consideration is necessary for equipment installed ~~at~~ in a location behind the occupant(s);
- a data bus/data connectivity between the installed equipment and other equipment which is:
  - ETSO authorised (or equivalent ~~authorisations~~); or
  - required by the TCDS, AFM or POH;
  - required by other applicable requirements such as those for operations and airspace; or
  - mandated by the respective MEL, if this exists;

is not allowed unless the equipment being installed is explicitly listed as compatible equipment by the manufacturer of the equipment to be connected to;

- fuses or circuit breakers are to be used when connecting the sailplane equipment ~~with~~ to the electrical system;

- the electrical load of the installed sailplane equipment should be considered; in **the** case of a powered sailplane equipped with a generator, by an electrical load analysis;
- a switch is required which allows **the pilot** to turn off the installed equipment independently;
- **the** instructions and tests defined by the equipment manufacturer have to be followed; ~~and~~
- ~~The~~ equipment is qualified suitable for the environmental conditions to be expected during normal operations; see CS STAN.42 in Subpart A for guidance. on compliance with the environmental conditions.

#### 4. Limitations

- The provided information is used in an advisory or supplementary manner (no hazard, no credit basis).
- Any limitations defined by the equipment manufacturer apply.

#### 5. Manuals

The AFMS shall, at least, contain:

- **a description of** the system ~~description,~~ **its** operating modes and functionality;
- the limitations and~~7~~ warnings;
- the emergency and normal operating procedures and limitations; ~~and~~
- instructions for software and database updates.

Amend **the** ICAs to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SC is not suitable for **the** release to service **of the aircraft** by the ~~P~~pilot-owner.

## Standard Change CS-SC403<sup>ab</sup>

### PROVISIONS FOR THE INSTALLATION OF LIGHTWEIGHT CAMERAS

#### 1. Purpose

The purpose of this SC is to specify the structural provisions for the installation of internally or externally mounted lightweight cameras on aircraft. The mounted camera needs to be self-contained, with internal batteries, and no external wiring.

Note: This SC does not apply to handheld~~hand-held~~ carry-on cameras, nor to devices worn by the pilot, e.g. helmet-mounted cameras.

#### 2. Applicability/Eligibility

Any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

For the purposes of this SC, the following definitions apply:

- ‘Installer’ means the person that releases~~ing~~ the aircraft to service (and that carries out this SC)~~the aircraft in accordance with i.a.w. AMC M.A.801 or AMC1 ML.A.801, as applicable; (carrying out this SC).~~
- ‘User’ means the pilot who attaches the camera to the aircraft in accordance with the data established and released by the installer.

The following standard applies:

- CAA UK CAP1369<sup>33</sup>, ~~Camera Mounts Guide~~~~Policy and Guidance on mounting cameras on aircraft~~, Appendix A, except for the maximum mass limit. The referenced light aircraft engineer (LAE) is to be substituted by the person that releases~~ing~~ the aircraft to service ~~in accordance with i.a.w. AMC M.A.801 or AMC1 ML.A.801, as applicable.~~

Additionally, the following considerations apply:

- As part of applying this SC, the installer shall:
  - define and record the locations where a camera can be installed on the individual aircraft; ~~and~~
  - list the acceptable and tested camera mountings, identifiable by a part number or similar.
- For cameras mounted inside the aircraft and behind the occupants, a pull test in the direction of flight for the primary mounting and the secondary retention, ~~if applicable~~, shall be performed using at least 15 times the weight of the unit.
- In the particular case of balloons and rotorcraft, pull tests are ~~to be performed~~:
  - ~~to be performed~~ on all positions where the camera can be installed, ~~and~~
  - ~~to be done~~ in all possible landing directions, including vertically downwards (-z).
- No items with sharp edges shall be installed in the proximity of the head of any occupant.

#### 4. Limitations

- The ~~M~~ maximum mass of the camera, including mountings, shall not exceed 300 g.
- The ~~M~~ maximum number of cameras installed on each wing and the empennage: 1 each.

<sup>33</sup> The document is available at the following website: <http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7204>

## 5. Manuals

The installer shall amend the AFM by an AFMS, which indicates:

- the dedicated locations where cameras can be attached;
- which combinations of mountings and cameras (identified by part numbers) are suitable at each location;
- how the mounting is to be attached; ~~and~~
- that GSM, UMTS, LTE, or similar transmission technologies with unknown or more than 100 mW output power shall be switched off during flight.

Based on the AFMS, cameras and their mounting systems can be attached by the user for the individual flight.

Amend the ICAs to establish maintenance actions/inspections and intervals, as outlined by CAA UK CAP1369, ~~Policy and Guidance on mounting cameras on aircraft~~, unless the AFMS limits the duration of the camera mount attached to less than 24 hours.

A placard must be installed visible to the pilot to caution ~~them~~ ~~him or her~~ about the potential effects that the installed camera might have on flight characteristics and performance.

## 6. Release to service

This SC is not suitable for the release to service of the aircraft by the Pilot-owner.

*Note:* Attaching the camera to the aircraft in accordance with the AFMS is not considered as maintenance according to Part-M or Part-ML and does not require a release to service, as the AFMS contains detailed instructions on how to attach the camera and its mounting system.

## SUBPART C — STANDARD REPAIRS

### LIST OF STANDARD REPAIRS

- CS-SR801<sup>ab</sup> — Aircraft Repair according to FAA Advisory Circular AC 43.13-1B
- CS-SR802<sup>cd</sup> — Repair of sailplanes, including powered sailplanes, LSA and VLA
- CS-SR803a — Temporary repair of canopy cracks by drilling a stopping hole
- CS-SR804<sup>ab</sup> — Use of alternative adhesives for repairs of wood and wooden mixed structures

## Standard Repair CS-SR801~~a~~<sup>b</sup>

### AIRCRAFT REPAIR ACCORDING TO FAA ADVISORY CIRCULAR AC 43.13-1B

#### 1. Purpose

This SR is issued to allow the use of FAA Advisory Circular AC 43.13-1B for repairs of aircraft structures with metal, composite, wood, and mixed structures.

*Note:* The classification of the repair according to the FAA AC is not required for SRs.

#### 2. Applicability/Eligibility

Aeroplanes that are not being complex motor-powered aircraft, and any ELA2 aircraft.

#### 3. Acceptable methods, techniques, and practices

The following standards contain acceptable data:

- FAA Advisory Circular AC 43.13-1B, together with AC 43.13-2B, Chapter 1.

All the structural parts identified in this SR are eligible for installation without an EASA Form 1.

#### 4. Limitations

- The person responsible for the design of the repair must be familiar with the applicable airworthiness requirements to determine that the repair data developed from AC 43.13-1B is appropriate for the product being repaired.
- This SR data is not applicable to metallic structures on products whose certification basis or an applicable AD includes damage-tolerance-based requirements.
- Where suitable TC-holder-approved repair data exists, this should be used before a SR is considered.
- This SR data is not applicable to critical parts, as defined in the manufacturer's data.
- For bonded repairs, the SR should not exceed a size above which the limit load cannot be sustained should if the repair fails. This can be alleviated in the case of ELA1 aircraft if the person responsible for the repair has sufficient experience in the design data, materials, process, repair size, and aircraft configuration.

*Note:* Where there is any doubt as to whether following AC 43.13-1B will result in compliance with the applicable requirements, instead of applying this SR, a repair design approval in accordance with Part 21 Part-21 should be obtained. Particular attention should be paid to repair designs where there is a risk of adversely affecting fatigue or aeroelastic characteristics, and the recommendations of AC 43.13-2B, ~~43-13-1b~~ should be followed.

#### 5. Manuals

Assess if whether the repair could require the issuance of an AFMS.

Amend the Instructions for Continuing Airworthiness (ICAs) to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SR is not suitable for the release to service of the aircraft by the Pilot-owner.

## Standard Repair CS-SR802<sup>ed</sup>

### REPAIR OF SAILPLANES, INCLUDING POWERED SAILPLANES, LSA AND VLA

#### 1. Purpose

This SR is issued to allow the use of established practices for the repair of metal, composite, wood, and mixed structures of light aircraft.

#### 2. Applicability/Eligibility

This SR is applicable to sailplanes, including powered sailplanes (as defined in ELA2), LSA, and VLA.

#### 3. Acceptable methods, techniques, and practices

All the structural parts identified in this SR are eligible for installation without an EASA Form 1.

Any of the following standards contain acceptable data:

for composite structures:

- ‘Kleine Fiberglas Flugzeug Flickfibel’ by Ursula Hänle<sup>34</sup>, or
- Seminardruck ‘Faserverbundwerkstoffe im Segelflugzeugbau’, Fortbildungsseminar des DAeC;

for wooden and mixed structures on sailplanes, including powered sailplanes:

- R.C. Stafford-Allen ‘Standard Repairs to Gliders’ by the British Gliding Association<sup>35</sup>, or
- ‘Werkstattpraxis für den Bau von Gleit- und Segelflugzeugen’ by Hans Jacobs;

for skin only:

- ‘Manuel de Reparation Generique pour la Reparation Des Planeurs en Materiaux Composites R02-15-A01, indice B’<sup>36</sup>, issued by the Federation Française de Vol à Voile (FFVV)<sup>37</sup>;

for general purposes:

- ‘Grundlagen der Luftfahrzeugtechnik in Theorie und Praxis’, Band II Verlag TÜV Rheinland GmbH, ISBN Nr.: 3-88585-001-X, or
- ‘Grundlagen der Luftfahrzeugtechnik in Theorie und Praxis’, Band V: Segelflugzeuge und Motorsegler, Verlag TÜV Rheinland GmbH, ISBN Nr.: 3-8249-0351-2.

The instructions and tests defined by the manufacturer of the repaired material have to be followed.

<sup>34</sup> Available at [under http://www.dg-flugzeugbau.de/flickfibel-d.html](http://www.dg-flugzeugbau.de/flickfibel-d.html). Also available in English under the title ‘Plastic Plane Patch Primer’.

<sup>35</sup> Available at [under https://members.gliding.co.uk/library/standard-repairs-to-gliders](https://members.gliding.co.uk/library/standard-repairs-to-gliders).

<sup>36</sup> ‘Indice B’ contains changes agreed with EASA, subsequent amendments shall be used only if referred to in CS-STAN.

<sup>37</sup> To retrieve the document, refer to <http://maintenance.navigabilite.ffvv.org/files/2017/03/manuel-de-reparation-generique-ffvv-ind-b-pour-cs-stan-easa-4.pdf>.

#### 4. Limitations

- The person responsible for the design of the repair must be familiar enough with the applicable airworthiness requirements to determine that the repair data developed from the references in ~~point~~ paragraph 3 above is appropriate ~~for~~ the product being repaired.
- Where suitable TC-holder-approved repair data exists, this should be used before a SR is considered.
- For bonded repairs, the SR should not exceed a size above which the limit load cannot be sustained ~~should~~ if the repair fails, unless the person responsible for the repair is sufficiently experienced with the design data, materials, process, repair size, and aircraft configuration.

*Note:* Where there is any doubt as to whether following the references in ~~point~~ paragraph 3 will result in compliance with the applicable requirements, instead of applying this SR, a repair design approval in accordance with Part 21 should be obtained. Particular attention should be paid to repair designs where there is a risk of adversely affecting fatigue or aeroelastic characteristics, and the recommendations of the references should be followed.

#### 5. Manuals

Assess whether the repair could require the issue of an AFMS.

Amend the ICAs to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

This SR is not suitable for the release to service of the aircraft by the pilot-owner.

## Standard Repair CS-SR804**a**

### USE OF ALTERNATIVE ADHESIVES FOR REPAIRS OF WOOD AND WOODEN MIXED STRUCTURES

#### 1. Purpose

This SR is issued to enable the use of an alternative adhesive/bonding system instead of initially approved conventional wood glue systems for the gluing/bonding process of wood and wooden mixed structure repairs.

This SR is not intended to substitute the repair design and method described in the applicable instructions for ~~continued~~ continuing airworthiness (such as a structural repair manual) provided by the TC holder; however, it gives the possibility to use alternative adhesives.

*Note:* This CS SR shall not ~~limit~~ prevent the TC or STC holder or designer ~~to~~ from approving different adhesives for their individual applications.

#### 2. Applicability/Eligibility

Aeroplanes and sailplanes, including powered sailplanes as defined in ELA1.

#### 3. Acceptable methods, techniques, and practices

The working conditions and wood conditions for the repair shall be such as the standard conditions described by the TC holder/industrial standard for wood bonding, and must be adjusted to individual conditions necessary for the alternate adhesive used, as required by the adhesive manufacturer (e.g. temperature, humidity, etc.).

The procedures of application and use as well as the restrictions given by the adhesive manufacturer in the specification and the instructions (such as glue layer thickness, temperature, humidity, etc.) are mandatory.

#### 4. Limitations

The use of alternative adhesives is allowed within the limitations given below, provided that this does not result in the need for a limitation on the aircraft capability:

- This SR does not cover the simultaneous application of different adhesive types with different chemical properties in ~~a~~ one single bond location (bond on bond).
- Any adhesive that complies with EN 301-I-90-GF-1,5-M or equivalent standard can be used as released by the manufacturer. The adhesive must have sufficient gap-filling capabilities to be within the given gap and curing pressure limits of the repair.
- For Epoxy-resin-based adhesives which does not fully comply or for which ~~has not demonstrated~~ conformity to EN 301-I-90-GF-1,5-M ~~has not been demonstrated~~, the following additional limitations apply:
  - This SR is not applicable for bonding of spars, main structure beam, and root ribs.
  - All epoxy-based bonded areas shall be limited to 50 °C operating temperature (e.g. surface of repair subject to direct sunlight has to be coloured white, a repair cannot be made in hot areas such as engine compartment, etc.).
  - The adhesive must be defined, tested, and released by the bond manufacturer as suitable for structural wood bonding.

- Parallel quality bonding tests of each mixture preparation shall be carried out, to verify proper hardening and bonding. This may also include sampling for delamination and shear strength by coupon testing.
- Epoxy-resin-based adhesives should only be used in areas that are not sensitive to moisture.
- The person responsible for the design and execution of the repair must be familiar enough with the use of the adhesive intended to be applied.
- The adhesive used and the conditions shall be recorded in EASA Form 123 or in referenced referred documentation. This shall include adhesive type, manufacturer, charge, curing temperature.

*Note:* Where there is any doubt as to whether following the references in point paragraph 3 will result in a non-compliance with the applicable requirements, instead of applying this SR, a repair design approval in accordance with Part 21 Part-21 should be obtained. Particular attention should be paid to repair designs where there is a risk of adversely affecting fatigue, environmental conditions (such as high temperature due to colour marking and painting) or aeroelastic aero-elastic characteristics. For those cases, the recommendations in the documentation referred to in Section 3 above of the references should be followed.

## 5. Manuals

Amend the ICAs to note the areas where non-original adhesive was used for bonding and to establish maintenance actions/inspections and intervals, as required.

## 6. Release to service

This SR is not suitable for the release to service of the aircraft by the Pilot-owner.

*Note:* The following, not non-exhaustive, list is intended to advise advice to known adhesive products. Compliance with this SR Standard Repair when using the referred adhesives listed below still needs to be verified.

*Adhesives compliant with EN 301-I-90-GF-1,5-M:*

*Aerodux 185 with Hardener HRP150/155 (dynea); Prefere 4094 (Dynea)*

*Epoxy-resin-based adhesives:*

*T-88 (System Tree); FPL 16 A; SP-106 (Gurit); Araldit AW134 (Ciba Geige)*