

# **GUERNSEY ADVISORY CIRCULAR (GACs)**



**GAC AIR-1**



**Standard Design  
Changes**

© Published by the Director of Civil Aviation, Guernsey

First Issue

(April 2019)

Guernsey Advisory Circulars (GACs) are issued to provide advice, guidance and information on standards, practices and procedures necessary to facilitate the application and processing of applications for services related to the Guernsey Aircraft Register.

They are not in themselves law or a regulation but may amplify provisions of the laws and regulations, including the Guernsey Aviation requirements, or provide practical guidance. Since GAC's are non-binding, regulated persons may choose alternative means to comply with the guidance. In this case, however, they lose the presumption of compliance provided by the circular and need to demonstrate to the Office of the Director Civil Aviation (ODCA) that they do comply with the law.

The definitive version of GACs is on the States of Guernsey website <http://www.cidca.aero/guernsey-aviation-requirementsgov.gg/> which should be viewed to establish the latest issue.

Enquiries regarding the content of this publication should be addressed to the Director of Civil Aviation, Guernsey Airport, Airport Terminal Building, La Villiaze, Forest, Guernsey, GY8 ODS.

Processing of applications will be done by the Guernsey Aircraft Registry, which operates as '2-REG'. For further information consult <http://www.2-reg.com> or send a message to [info@2-reg.com](mailto:info@2-reg.com).

## Checklist of Pages

|                    | Page no | Issue no | Date       |
|--------------------|---------|----------|------------|
| Title page         |         | 1        | April 2019 |
| Checklist of pages | i       | 1        | April 2019 |
|                    | ii      | 1        | April 2019 |
| Revisions          | iii     | 1        | April 2019 |
| Contents           | iv      | 1        | April 2019 |
|                    | 1       | 1        | April 2019 |
|                    | 2       | 1        | April 2019 |
|                    | 3       | 1        | April 2019 |
|                    | 4       | 1        | April 2019 |
|                    | 5       | 1        | April 2019 |
|                    | 6       | 1        | April 2019 |
|                    | 7       | 1        | April 2019 |
|                    | 8       | 1        | April 2019 |
|                    | 9       | 1        | April 2019 |
|                    | 10      | 1        | April 2019 |
|                    | 11      | 1        | April 2019 |
|                    | 12      | 1        | April 2019 |
|                    | 13      | 1        | April 2019 |
|                    | 14      | 1        | April 2019 |
|                    | 15      | 1        | April 2019 |
|                    | 16      | 1        | April 2019 |
|                    | 17      | 1        | April 2019 |
|                    | 18      | 1        | April 2019 |
|                    | 19      | 1        | April 2019 |
|                    | 20      | 1        | April 2019 |
|                    | 21      | 1        | April 2019 |
|                    | 22      | 1        | April 2019 |
|                    | 23      | 1        | April 2019 |
|                    | 24      | 1        | April 2019 |
|                    | 25      | 1        | April 2019 |
|                    | 26      | 1        | April 2019 |
|                    | 27      | 1        | April 2019 |
|                    | 28      | 1        | April 2019 |
|                    | 29      | 1        | April 2019 |
|                    | 30      | 1        | April 2019 |
|                    | 31      | 1        | April 2019 |
|                    | 32      | 1        | April 2019 |
|                    | 33      | 1        | April 2019 |
|                    | 34      | 1        | April 2019 |
|                    | 35      | 1        | April 2019 |
|                    | 36      | 1        | April 2019 |
|                    | 37      | 1        | April 2019 |
|                    | 38      | 1        | April 2019 |
|                    | 39      | 1        | April 2019 |
|                    | 40      | 1        | April 2019 |

|  |    |   |            |
|--|----|---|------------|
|  | 41 | 1 | April 2019 |
|  | 42 | 1 | April 2019 |
|  | 43 | 1 | April 2019 |
|  | 44 | 1 | April 2019 |
|  | 45 | 1 | April 2019 |
|  | 46 | 1 | April 2019 |
|  | 47 | 1 | April 2019 |
|  | 48 | 1 | April 2019 |
|  | 49 | 1 | April 2019 |
|  | 50 | 1 | April 2019 |
|  | 51 | 1 | April 2019 |
|  | 52 | 1 | April 2019 |
|  | 53 | 1 | April 2019 |
|  | 54 | 1 | April 2019 |
|  | 55 | 1 | April 2019 |
|  | 56 | 1 | April 2019 |
|  | 57 | 1 | April 2019 |
|  | 58 | 1 | April 2019 |
|  | 59 | 1 | April 2019 |
|  | 60 | 1 | April 2019 |
|  | 61 | 1 | April 2019 |
|  | 62 | 1 | April 2019 |
|  | 63 | 1 | April 2019 |
|  | 64 | 1 | April 2019 |
|  | 65 | 1 | April 2019 |
|  | 66 | 1 | April 2019 |

## Revisions

| GAC Issue | Subject     |
|-----------|-------------|
| Issue 1   | First issue |
|           | —           |

## Contents

|                                                                           |            |
|---------------------------------------------------------------------------|------------|
| <b>Checklist of Pages</b>                                                 | <b>i</b>   |
| <b>Revisions</b>                                                          | <b>iii</b> |
| <b>Contents</b>                                                           | <b>iv</b>  |
| <b>1 - Purpose</b>                                                        | <b>1</b>   |
| <b>2 - Related laws, regulations and requirements</b>                     | <b>1</b>   |
| <b>3 - Definitions</b>                                                    | <b>1</b>   |
| <b>4 - Applicability</b>                                                  | <b>1</b>   |
| <b>5 - Operational Limitations or restrictions</b>                        | <b>2</b>   |
| <b>6 - Changes/Repairs that are not in conflict with TC holders' data</b> | <b>2</b>   |
| <b>7 - Referenced documents</b>                                           | <b>2</b>   |
| <b>8 - Instructions for Continuing Airworthiness</b>                      | <b>3</b>   |
| <b>9 - Aircraft Flight Manual Supplement (AFMS)</b>                       | <b>3</b>   |
| <b>10 - Definitions and Abbreviations</b>                                 | <b>3</b>   |
| <b>Appendix A List of Standard Changes</b>                                | <b>5</b>   |
| <b>Appendix B List of Standard Repairs</b>                                | <b>57</b>  |
| <b>Appendix C Release to Service</b>                                      | <b>64</b>  |

## **1 – Purpose**

This GAC contains design data with acceptable methods, techniques, and practices for carrying out and identifying Standard Changes (SCs) and Standard Repairs (SRs). SCs/SRs, designed in compliance with this GAC, are not subject to an approval process, and, therefore, can be embodied in an aircraft when the conditions set out in the relevant paragraphs of GAR Part 21 for SCs/SRs, i.e. 21.76 or 21.436, are met. Appendix A and Appendix B contain a list of standard changes and repairs permitted under 21.76 or 21.436. Other changes/repairs not included in these appendices cannot be considered as SCs/SRs. In particular this GAC cannot be used to install or exchange integrated avionic or navigation systems, unless explicitly allowed. Acceptable means of compliance for the release to service of aircraft modified or repaired through embodiment of SCs or SRs are provided in Appendix C. 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: Standard Changes and Standard Repairs are not meant to be used in serial production.

## **2 - Related laws, regulations and requirements**

This GAC relates to:

GAR 21.76 (standard design changes) and;  
GAR 21.436 (standard repairs).

No rights can be derived from this document. For exact details please refer to The Air Navigation (Bailiwick of Guernsey) Law, 2012 (Law). In case of conflict between this guidance document and the Law, 2012, the latter shall prevail.

## **3 – Definitions**

Definitions, in the context of this GAC shall have the meanings listed in GAR Part 1 (Definitions, Abbreviations and Units of Measurement).

## **4 – Applicability**

In addition to the conditions of 21.76 and 21.436, each SC/SR may further restrict its applicability to certain aircraft, or to some areas of an aircraft, or to certain aircraft operations.

## **5 – Operational Limitations or restrictions**

SCs/SRs, as described in this GAC, may contain operational limitations or restrictions with regard to the use of an aircraft instrument/equipment. Equipment installed as part of an SC cannot be used to eliminate or reduce the existing airworthiness limitations and operational limitations of the aircraft (e.g. an aircraft certified only for VFR operation cannot be authorised to operate IFR as a result of modifications embodied through this GAC). As a consequence, an SC might introduce limitations on the use of the installed equipment (e.g. a navigation equipment may be installed following an SC, but this installation may not permit that the equipment is used as a primary navigation means if the functionality did not exist before the change was embodied). Any restriction or limitation applicable due to the embodiment of the SC/SR is included in the aircraft manuals or records, as necessary, and in Guernsey Form 123.

## **6 – Changes/Repairs that are not in conflict with TC holders' data**

Each SC/SR has an applicability independent of the aircraft type and can be embodied in/on an aircraft type unless the SC/SR is in conflict with any information or limitation given by the TC holder as part of the approved aircraft flight manual (AFM), or the approved sections of the instructions for continued airworthiness (ICA). In case of conflict between Airworthiness Directive (AD) provisions and Standard Changes or Repairs, the AD takes precedence.

## **7 – Referenced documents**

The acceptable methods, techniques and practices contained in this GAC may refer to other documents. Design and production considerations or operational restrictions/limitations established in these documents are applicable unless otherwise stated and, therefore, may further restrict the applicability of the SC/SR. The same applies to other documents referred to in these aforementioned referenced documents. Any restriction or limitation established in the referenced document, directly or 'in cascade', affecting the operation or airworthiness of the aircraft, is included in the aircraft manuals or records, as necessary, and in Guernsey Form 123. Other references mentioned in these documents and quoted 'as example', 'for information', etc. are to be considered, but the installer must ensure that the example or information is applicable to the design being undertaken and not in contradiction with TC holders data before using it. The latest available versions of the third-party references should be considered unless otherwise stated by the Director.

References to other (e.g. foreign) legislation in the referenced documents are not applicable and are replaced by the relevant Guernsey rules (e.g. approval process described in FAA Advisory Circular AC 43.13 to obtain an FAA field approval should be ignored and, instead, the installer should follow the Guernsey rules).



## **8 – Instructions for Continuing Airworthiness**

Due to the SC/SR being embodied, the aircraft instructions for continuing airworthiness may need to be updated. This update is considered to be part of this SC/SR, and, therefore, requires no specific approval.

## **9 – Aircraft Flight Manual Supplement (AFMS)**

Due to the SC/SR being embodied, the AFM may need to be updated. This manual supplement is considered to be part of this SC/SR, and, therefore, requires no specific approval.

## **10 – Definitions and Abbreviations**

‘ADF’ means airborne automatic direction finding.

‘ADS-B’ means automatic dependent surveillance - broadcast

‘AEH’ means airborne electronic hardware

‘AFCS’ means automatic flight control system

‘AFM(S)’ means aircraft flight manual (supplement)

‘AoA’ means angle of attack

‘DC-PSS’ means direct current power supply system

‘ELA1 aircraft’ for the purpose of this GAC means the following manned European Light Aircraft:

(i) an aeroplane with a Maximum Take-off Mass (MTOM) of 1 200 kg or less that is not classified as complex motor-powered aircraft;

(ii) a sailplane or powered sailplane of 1 200 kg MTOM or less.

‘ELA2 aircraft’ for the purpose of this GAC means the following manned European Light Aircraft:

(i) an aeroplane with a Maximum Take-off Mass (MTOM) of 2 000 kg or less that is not classified as complex motor-powered aircraft;

(ii) a sailplane or powered sailplane of 2 000 kg MTOM or less;

(iii) Very Light Rotorcraft.

An aircraft may comply with both ELA1 and ELA2 definitions, and, therefore, be classified as per both ELA1 and

ELA2 categories of aircraft for the purpose of this GAC.

‘ETSO equivalent’ an article is equivalent to an authorised ETSO article if it has been accepted in accordance with

provisions of international bilateral safety agreements.

‘Exchange’ means the substitution of an existing equipment or instrument (or parts of a system) with a

different one with a different part number which provides the same functionality/information.

‘FAA’ means Federal Aviation Administration

‘FMS’ means flight management system

‘GNSS’ means global navigation satellite system such as GPS, Galileo etc

‘GPS’ means global positioning system

‘ICA’ instructions for continued airworthiness

‘IFR’ means instrument flight rules.

‘IMC’ means instrumental meteorological conditions.

‘Installation’ means the embodiment in/on the aircraft of equipment, instrument or system to provide a new

function or new information not previously available at the aircraft. Unless otherwise mentioned, whenever a

SC covers an ‘Installation’ of an equipment/instrument/system, the exchange of the equipment/instrument/

system is also covered by the same SC.

‘ISA’ means international standard atmosphere

‘LED’ means light-emitting diode

‘LSA’ means light sport aeroplane

‘MEL’ means minimum equipment list

‘MFD’ means multifunctional displays

‘MTOM’ means maximum take-off mass.

‘NTO’ means non-technical objection.

‘NVIS’ means night vision imaging system

‘PED’ means portable electronic device

‘Pilot-owner’ means a person qualified in accordance with GAR 43 Appendix A

‘POH’ means pilot operating handbook

## Appendix A List of Standard Changes

### Standard Change 1a

#### 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 not being complex motor-powered aircraft with a maximum cruising speed in ISA conditions below 250 kts, 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 2.

Additionally, the following applies:

— The equipment is authorised in accordance with JTSO-2C37d, JTSO-2C37e, ETSO-2C37e, JTSO-2C38d,

JTSO-2C38e, ETSO-2C38e or ETSO-2C169a, or later amendments, or equivalent.

— The equipment is capable of 8.33 kHz and 25 kHz channel spacing.

— 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             |
| 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 for the environmental conditions to be expected during normal operation.

— Instructions and tests defined by the equipment manufacturer have to be followed.

#### 4. Limitations

Any limitations defined by the equipment manufacturer apply.

The equipment installation cannot be used to extend the operational capability 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 AFMS containing or referencing the equipment instructions for operation, as required.

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

#### 6. Release to service

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

## **Standard Change 2b**

### **INSTALLATION OF MODE S ELEMENTARY SURVEILLANCE EQUIPMENT**

#### **1. Purpose**

Installation or exchange of Mode S transponder including, optionally, an altitude encoder exchange. This SC does not include installation of antennas.

#### **2. Applicability/Eligibility**

Aeroplanes not being complex motor-powered aircraft with a maximum cruising speed in ISA conditions below 250 kts, 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 2.

Additionally, the following applies:

- The transponder equipment and its installation are in compliance with paragraph CS ACNS.D.ELS.010 of CS-ACNS and the altitude encoder meets ETSO-C88A or equivalent.
- The elementary surveillance system provides 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 connected to the static pressure system providing pressure to the instrument used to control the aircraft.
- Any antenna connected to the transponder has a resulting pattern which is vertically polarised, omnidirectional in the horizontal plane and has sufficient vertical beam width to ensure proper system operation during normal aircraft maneuvers.
- The equipment is qualified for the environmental conditions to be expected during normal operation.
- Instructions from equipment manufacturer have to be followed.
- A system ground test verifying all transmitted data according to ACNS.D.ELS.015 has to be performed.

#### **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 an SC.

This SC does not satisfy requirements set by CS-ACNS Subpart D Section 4 1090 MHz Extended Squitter (ES) ADS-B Out installations compliant to Section 4 of CS-ACNS or nor AMC 20-24.

However, the voluntary transmission of additional ADS-B data (e.g. GPS position and velocity) can be accepted when the position and velocity quality indicators report the lowest quality, the equipment manufacturer has stated compatibility with the directly

connected GNSS source, and the transponder is not authorised in accordance with ETSO-C166b or equivalent.

In case a TABS equipment is already installed in the aircraft, the Mode S Transponder system cannot be installed using this GAC.

#### 5. Manuals

Amend AFM with AFMS containing or referencing the equipment instructions for operation, as required.

Amend ICA to establish maintenance actions/inspections and intervals, as required. In particular, include a check every two years in accordance with the latest version of EASA SIB No. 2011-15.

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

#### 6. Release to service

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

## **Standard Change 3b**

### **INSTALLATION OF AUDIO SELECTOR PANELS AND AMPLIFIERS**

#### **1. Purpose**

Installation or exchange of audio selector panels and amplifiers

#### **2. Applicability/Eligibility**

Aeroplanes 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 2.

Additionally, the following applies:

- the equipment is authorised in accordance with ETSO-C50c or ETSO-C139a, or later amendments, or equivalent;
- the equipment has at least the audio functionality of previous installed equipment, and is compatible with the existing installation;
- the equipment is compatible with connections to existing communication and navigation systems;
- the equipment is qualified for the environmental conditions to be expected during normal operation; and
- 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 rotorcraft approved for NVIS, if cockpit panels are to be inserted, the change cannot be considered an SC.

#### **5. Manuals**

Amend AFM with AFMS containing or referencing the equipment instructions for operation, as required.

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

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

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

## **Standard Change 4a**

### **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.

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

#### **2. Applicability/Eligibility**

Aeroplanes 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 & 3; and
- FAA Advisory Circular AC 43.13-1B, Chapter 11, Section 15 (on electrical bonding).

Additionally, the following applies:

- 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.
- The antenna is located in a distance to other antennas appropriate for the aircraft and the antennas.
- The antenna is compatible with the connected equipment and is suitable for the environmental conditions to be expected during normal operation.
- For aircraft certified to operate in known icing conditions, the new antenna is located at the same position and has a size similar to that of the existing antenna being replaced.
- Instructions and tests defined by the equipment manufacturer have to be followed.
- The performance of the new antenna installation or of the new antenna type has to be confirmed during testing after installation (e.g. range of radio).

#### **4. Limitations**

Any limitations defined by the equipment manufacturer apply.

#### **5. Manuals**

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

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

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



## **Standard Change 031b**

### **EXCHANGE OF CONVENTIONAL ANTI-COLLISION LIGHTS, POSITION LIGHTS AND LANDING & TAXI LIGHTS BY LED TYPE LIGHTS**

#### **1. Purpose**

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

#### **2. Applicability/Eligibility**

Aeroplanes not being complex motor-powered aircraft, rotorcraft 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 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).

Additionally the following applies:

- anti-collision lights are authorised in accordance with ETSO-C96a or later amendments, or equivalent;
- position lights are authorised in accordance with ETSO-C30c or later amendments, or equivalent;
- the equipment is installed at the same location with identical light distribution angles and colours;
- the equipment is qualified for the environmental conditions to be expected during normal operation;
- instructions and tests defined by the equipment manufacturer have to be followed; and
- any modification of electrical wiring is performed in accordance with acceptable practices such as the aircraft maintenance manual or Chapter 11 of FAA Advisory Circulars AC 43.13-1B 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 AFMS containing equipment instructions for operation, as required. Amend ICA to establish maintenance actions/inspections and intervals, as required. In particular, consider description of required maintenance actions after failure of single LED segments.

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

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

## **Standard Change 032a**

### **INSTALLATION OF ANTI-COLLISION LIGHTS**

#### **1. Purpose**

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

Exchange of anti-collision lights is covered by SC 031.

#### **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).

#### **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 & 4;
- FAA Advisory Circular AC 43.13-1B Chapter 11; and
- FAA Advisory Circular AC 20-30B.

Additionally, the following applies:

- The equipment is authorised in accordance with ETSO-C96a or later amendments, or equivalent;
- The anti-collision light is located in a distance to other systems 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;
- Impact on weight and balance needs to be considered;
- Instructions and tests defined by the equipment manufacturer have to be followed and recorded; and
- Any modification of electrical wiring is performed in accordance with acceptable practices such as the aircraft maintenance manual or Chapter 11 of FAA Advisory Circular AC 43.13-1B.

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

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

— Anti-collision lights may be installed if their total weight, including reinforcements, is equal or lower than a certified 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 within Guernsey Form 123.

— Anti-collision lights installation shall not alter torsional stiffness.

##### **3.2 Anti-collision lights installed on 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 anticollision light is being installed on an existing provision with the same footprint.

#### 4. Limitations

- Any limitation defined by the equipment manufacturer applies.
- No installation of anti-collision lights on control surfaces is permitted.
- Only installation on wings without sweep angle is allowed.
- Installation of anti-collision lights in wings with aspect ratio above 7 is not permitted

#### 5. Manuals

Amend AFM with AFMS containing or referencing the equipment instructions for operation, as required.

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

#### 6. Release to service

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

## **Standard Change 033a**

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

#### 1. Purpose

Installation or exchange of cabin and cockpit conventional lights by LED-type lights. Installation of new warning, caution, or advisory lights is not covered by this Standard Change.

#### 2. Applicability/Eligibility

Aeroplanes not being complex motor-powered aircraft, rotorcraft 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 contain acceptable data:

- FAA Advisory Circular AC 43.13-1B, Chapter 11.

Additionally the following applies:

- any installation or exchange of lights shall not interfere or degrade the existing emergency lights system;

- in case of exchange of conventional lights by LED lights, the equipment should be installed at the same location and with identical light distribution angles and colours, or at least

the new LED lights shall provide adequate lighting without introducing glare and/or reflections that could distract the flight crew or interfere with crew vision; and

for lights exchanged in the cockpit:

if warning, caution, or advisory lights are exchanged they must be:

- 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 case of installation of LED lights:

they shall provide adequate lighting without introducing glare and/or reflections that could distract the flight crew or interfere with crew vision; and

if they are installed in the cockpit, they can be of any colour, provided the colour differs sufficiently from the colours used for warnings, cautions, and advisories to avoid possible confusion.

- the equipment is qualified for the environmental conditions to be expected during normal operation;

- instructions and tests defined by the equipment manufacturer have to be followed; and

— any modification of electrical wiring is performed in accordance with acceptable practices such as the AFM or FAA Advisory Circular AC 43.13-1B, Chapter 11.

#### 4. Limitations

Any limitation defined by the equipment manufacturer applies.

#### 5. Manuals

If needed, amend AFM with AFMS containing equipment instructions for operation, as required.

Amend ICA to establish maintenance actions/inspections and intervals, as required. In particular, consider description of required maintenance actions after failure of a single LED segment.

#### 6. Release to service

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

## **Standard Change 034a**

### **EXCHANGE OF EXISTING BATTERY BY LITHIUM IRON PHOSPHATE (LIFEPO4) BATTERIES**

#### **1. Purpose**

Exchange of existing batteries by LiFePO4 type batteries in aircraft.

This SC does not cover or replace applicable regulations for handling, storage, transport, and disposal of batteries.

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

#### **2. Applicability/Eligibility**

Sailplanes including powered sailplanes.

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

— Acceptable standards for the battery or the battery cells test (performed and stated by the battery manufacturer) are:

RTCA DO-347, Certification Test Guidance for Small and Medium Sized Rechargeable Lithium

Batteries and Battery Systems; or

UL 1642, Standard for Lithium Batteries; or

UL 2054, Standard for Household and Commercial Batteries.

— For installation purposes, the FAA Advisory Circular AC 43-13-2B, Chapters 1 and 2 are acceptable.

— Impact on weight and balance needs to be considered.

#### **4. Limitations**

— Batteries used for electrical or hybrid propulsion are not covered.

— Starter batteries are not covered.

— The battery shall have an integrated battery management system provided by the battery manufacturer.

— The battery shall have a maximum capacity of 160 Wh.

— Any limitation defined by the battery manufacturer applies.

#### **5. Manuals**

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

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

Release to service by the Pilot-owner is acceptable only if the original battery mounting and connectors remain.

## **Standard Change 051b**

### **INSTALLATION OF 'FLARM' EQUIPMENT**

Note: Originally FLARM® was developed for sailplanes but nowadays such devices are more and more installed in light aeroplanes as well.

#### **1. Purpose**

Installation or exchange of FLARM® Anti-Collision Awareness Systems. The system is based on the specifications as defined by FLARM Technology GmbH.

Note: FLARM is not compatible with Transponder Mode A/C/S, ADS-B or TCAS/ACAS.

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

This SC does not cover the installation of external antennas (see SC 004, which may be applied concurrently).

#### **2. Applicability/Eligibility**

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.

Additionally, the following applies:

— The design of the equipment installation must take into account crashworthiness, arrangement and visibility, interferences with other equipment, 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 installed at a location behind the occupant(s).

— A data bus/data connectivity between the FLARM device and other equipment which is:

ETSO authorised (or equivalent); or

required by TCDS, AFM or POH;

required by other applicable requirements such as those for operations and airspace; or mandated by the respective Minimum Equipment List (MEL), if this exist, is not allowed unless the FLARM device is explicitly listed by its manufacturer as compatible equipment to be connected to.

— The equipment is suitable for the environmental conditions to be expected during normal operation.

— Instructions and tests defined by the equipment manufacturer have to be followed.

— Fly the aircraft to assess for satisfactory antenna coverage and identify eventual limitations, by analyzing data from the built-in flight recorder with the 'FLARM Range Analyzer' tool of FLARM Technology GmbH (available at [www.flarm.org](http://www.flarm.org)).

*Note: The above mentioned flight is considered part of the SC installation activity and can be conducted without a 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 understanding the aircraft configuration (i.e. FLARM installation not yet released to service). Guernsey Form 123 and the certificate of release to service for the installation of the SC should be issued after assessing satisfactorily the result provided by the FLARM range analyzer tool.*

#### 4. Limitations

- The FLARM® based system cannot be used to substitute any Anti-Collision Device mandated by Guernsey OPS rules for the operation intended. The system is not to be used in conjunction with night vision systems or in night or IMC conditions.
- Any limitations defined by the manufacturer of the FLARM® device.

#### 5. Manuals

The AFMS shall, at least, contain:

- the system description, operating modes and functionality;
- limitations, warnings and placards, at least, for the following:  
'For situational awareness only'  
'Use in VFR day only';
- the normal and emergency operating procedures; and
- instructions for software and database updates.

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

#### 6. Release to service

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



## **Standard Change 052b**

### **INSTALLATION OF GNSS EQUIPMENT**

#### **1. Purpose**

Installation or exchange of a GNSS equipment to enhance situational awareness. This also includes moving map GNSS based functions. This SC does not include installation of external antennas (see SC 004, which may be applied concurrently).

For integrated systems also providing voice communications functionality and/or a VOR navigation capability SC 052 may be applied concurrently with SC 001 and/or SC 056.

This SC does also not cover the connection of the GNSS equipment to any kind of AFCS nor to ADS-B OUT system.

#### **2. Applicability/Eligibility**

Non-pressurised aircraft with less than 2 721 kg (6 000 pounds) MTOM other than rotorcraft approved for NVIS.

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

The following standard contains acceptable data:

- 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, Chapter 1 and 2.

Additionally, the following applies:

- the design of the equipment installation must take into account crashworthiness, arrangement and visibility, and should not interfere with other equipment, the canopy jettison (if applicable), and the emergency exit;
- data connectivity with the installed equipment and other equipment which is:  
required by 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 by its manufacturer as compatible equipment to be connected to;
- the equipment is suitable for the environmental conditions to be expected during normal operation;
- the equipment must be installed and tested in accordance with the equipment manufacturers' instructions.

#### **4. Limitations**

- The system is used for situational awareness under VFR only.
- The equipment installation cannot be used to extend the operational capability of the specific aircraft (e.g. from VFR to IFR);
- All relevant integrated databases (e.g. for charts) must be current;
- Any limitations defined by the equipment manufacturer apply.

## 5. Manuals

The AFMS shall, at least, contain:

- the system description, operating modes and functionality;
- a limitations stating the following:  
'For situational awareness only',
- the normal and emergency operating procedures; and amend the maintenance manual with instructions for software and database updates.

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

## 6. Release to service

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

## **Standard Change 055b**

### **EXCHANGE OF ADF EQUIPMENT**

#### **1. Purpose**

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

#### **2. Applicability/Eligibility**

Aeroplanes not being complex motor-powered aircraft, rotorcraft not being complex motor-powered aircraft with the ADF equipment not connected to AFCS with upper modes and integrated FMS navigation system, 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.

Additionally, the following applies:

— the equipment is authorised in accordance with ETSO-2C41d, or later amendment, or equivalent;

— the equipment has the same functionality, is installed at the same location, and is compatible with the existing installation, as well as with connections to existing flight management/navigation systems;

— the equipment is qualified for the environmental conditions to be expected during normal operation;

and

— instructions and tests defined by the equipment manufacturer have to be followed.

#### **4. Limitations**

Any limitations defined by the equipment manufacturer apply.

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.

#### **5. Manuals**

Amend AFM with AFMS containing or referencing the equipment instructions for operation, as required. Amend ICA to establish maintenance actions/inspections and intervals, as required.

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

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

## **Standard Change 056b**

### **EXCHANGE OF VOR EQUIPMENT**

#### **1. Purpose**

Exchange of VOR equipment including Localizer/Glideslope indicator and converter. This SC does not include installation of antennas.

#### **2. Applicability/Eligibility**

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

Additionally, the following applies:

- the equipment is authorised in accordance with ETSO-2C40c, or later amendment, or equivalent;
  - the equipment has the same functionality, is installed at the same location, and is compatible with the existing installation;
  - the equipment is compatible with connections to existing flight management/navigation systems;
  - the equipment is qualified for the environmental conditions to be expected during normal operation;
- and
- instructions and tests defined by the equipment manufacturer have to be followed.

#### **4. Limitations**

Any limitations defined by the equipment manufacturer apply.

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.

#### **5. Manuals**

Amend AFM with AFMS containing or referencing the equipment instructions for operation, as required. Amend ICA to establish maintenance actions/inspections and intervals, as required.

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

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

## **Standard Change 058a**

### **INSTALLATION OF TRAFFIC AWARENESS BEACON SYSTEM (TABS) EQUIPMENT**

#### **1. Purpose**

Installation of TRAFFIC AWARENESS BEACON SYSTEM (TABS).

TABS equipment are intended for voluntary equipage on aircraft not required to carry a transponder or automatic dependent surveillance - broadcast (ADS-B) equipment. This SC does not qualify the TABS equipment installation to meet the transponder or ADS-B requirements defined in the GARs, therefore, this TABS installation is not sufficient to fly into transponder mandatory zones (TMZ). Additional requirements may apply, ref to SC 002b or later amendment.

The installation of a TABS will enable an aircraft to be visible to air navigation service providers and other aircraft equipped with:

- traffic advisory system (TAS); or
- traffic alert and collision avoidance system I (TCAS I); or
- traffic alert and collision avoidance system II (TCAS II); or
- ADS-B IN capability.

#### **2. Applicability/Eligibility**

Aeroplanes 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, Chapters 1 and 2. Additionally, the following applies:
  - The equipment is authorised according to ETSO-C199<sup>4</sup>;
  - The design of the equipment installation must take into account crashworthiness, arrangement and visibility, interferences with other equipment, 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 installed at a location behind the occupant(s);
  - data connectivity with the TABS equipment and other equipment which is:
    - required by TCDS, AFM or POH; or
    - required by other applicable requirements such as those for operations and airspace;
- or
- mandated by the respective minimum equipment list (MEL), if this exists, is not allowed unless the TABS is explicitly listed by its manufacturer as compatible equipment to be connected to;
- The equipment is suitable for the environmental conditions to be expected during normal operation;
- Instructions and tests defined by the equipment manufacturer have to be followed.

#### 4. Limitations

- Any limitation defined by the manufacturer of the TABS equipment.
- ADS-B IN information, if provided, is for situational awareness only.
- In case a Mode A/C/S Transponder system is already installed in the aircraft, the TABS equipment cannot be installed using this GAC.

#### 5. Manuals

The AFMS shall, at least, contain:

- the system description, operating modes and functionality;
- the normal and emergency operating procedures;
- If the TABS provides ADS-B IN information, the AFMS must include a statement that the ADS-B IN data is to be used for situational awareness only.

Amend ICA to establish maintenance actions/inspections and intervals, as required, including instructions in case of software and database updates.

#### 6. Release to service

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

<sup>4</sup> ETSO-C199 will be published as part of CS-ETSO issue 13.

## **Standard Change 081a**

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

#### **1. Purpose**

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

#### **2. Applicability/Eligibility**

Sailplanes including powered sailplanes.

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

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

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

Often the aircraft needs to be placed on jacks or the fuselage needs to be turned upside down (in case of disassembled sailplanes) to allow such a disassembly. Information of the manufacturer or STC holder needs to be observed for the jacking or turning upside down. As tyres increase in size with time, and a new tube may move in such a worn-out tyre, and an old tube may chafe in a new tyre more easily, it is recommended to always replace both the tyre and the tube at the same time.

Tyres shall only be replaced by tyres having 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 proper function of the brake system and landing gear retraction system when applicable
- check that the tyre has the required minimum space for turning freely.

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

#### **4. Limitations**

N/a

#### **5. Manuals**

N/a

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

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

## **Standard Change 082a**

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

#### **1. Purpose**

This SC is intended to allow 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 exchange of a rubber skid by a rubber skid with a small wheel.

#### **2. Applicability/Eligibility**

Sailplanes including powered sailplanes.

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

Before exchange the old skid and any left-overs of the old bonded skid/glue needs to be removed.

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

Typically the installation is by gluing the rubber skid to the surface of the underside of the wing or fuselage tail. The glue to be used may be of an industrial glue type (e.g. 'Pattex®') or an acrylic mounting glue (e.g. 'Sikaflex®').

Before performing the new glue bonding, clean all 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 enter into the glue joint.

If the aircraft manufacturer or STC holder requires a wire deflector to prevent 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 towards a rubber skid with 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 which simulates the dropping of the tail or wing tip during a landing.

Use of this SC for 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 not have 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.

#### **4. Limitations**



N/a

5. Manuals

N/a

6. Release to service

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

## **Standard Change 083a**

### **EXCHANGE OF FLEXIBLE SEALS ON CONTROL SURFACES**

#### **1. Purpose**

This SC is intended to allow exchange of flexible seals as installed on control surfaces on wings and 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 tapes to the surfaces of the control surface and/or wing or tail surface. Before exchange the old seal and any left-overs of the old bonded seal/glue needs to be removed.

Any applicable instructions provided by the aircraft manufacturer or STC holder must be applied to avoid damages 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 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 towards 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 the control surface over the full range of control surface movement to prevent reduction of performance or later noise during deflections.

The exchange is not allowed if the seals do not have 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 noises or influence upon controllability shall be performed and a qualitatively satisfactory result is recorded in the Guernsey Form 123.

After installation of the replacement seals, fly the aircraft to qualitatively assess effects on noises and influence upon controllability.

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 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 understanding the aircraft configuration (i.e. exchange of flexible seals not yet released to service). Guernsey

Form 123 and the certificate of release to service for the installation of the SC should be issued after assessing satisfactorily the result.

4. Limitations

N/a

5. Manual

N/a

6. Release to service

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

## **Standard Change 101b**

### **INSTALLATION OF EMERGENCY LOCATOR TRANSMITTER (ELT) EQUIPMENT**

#### **1. Purpose**

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

#### **2. Applicability/Eligibility**

Aeroplanes with MTOM below 2 730 kg, rotorcraft not being complex motor-powered aircraft with MTOM below 1 200 kg and four or less occupants, 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 2. Additionally, the following applies:
- Instructions from equipment manufacturer have to be followed.
- A position for the installation needs to be chosen avoiding 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 or later amendments, or equivalent.
- The ELT 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 an SC.

#### **5. Manuals**

Amend AFM with AFMS containing or referencing the equipment instructions for operation, as required. Amend ICA to establish maintenance actions/inspections and intervals, as required.

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

This SC is not suitable for release to service 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 102a**

### **INSTALLATION OF DC POWER SUPPLY SYSTEMS (PSS) FOR PORTABLE ELECTRONIC DEVICES (PED)**

#### **1. Purpose**

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

#### **2. Applicability/Eligibility**

Aeroplanes 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 43.13-1B, Chapter 11. Additionally the following applies:
- Any modification of 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;
- 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 switch' for deactivating the entire DC-PSS, 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 shown to be appropriately rated for the number of switch cycles expected during the service life of the system or of the circuit breaker;

The on/off switch is not mandatory for USB outlets provided that the PEDs power supply cables are easily accessible in flight to be disconnected from the USB outlets at any time by the crew member;

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 affect the proper operation of the magnetic direction indicator;
  - the DC-PSS shall not impair access, view or operation of cockpit controls or instruments;
- and
- the DC-PSS shall not unduly impair the external view of the pilot.
  - If there are essential power 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 and 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 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 PED. This assessment shall be recorded in the Form 123; and

- After installation, a full aircraft EMI test shall be performed in accordance with FAA Advisory Circular AC 43.13-1B, Chapter 11
- The equipment is qualified for the environmental conditions to be expected during normal operation;
- Instructions and tests defined by the equipment manufacturer shall be followed.

#### 4. Limitations

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

This SC only allows the installation of DC-PSS with a maximum power per outlet limited to 20 watts. Any limitation defined by the equipment manufacturer applies.

#### 5. Manuals

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

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

#### 6. Release to service

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

## **Standard Change 103a**

### **EXCHANGE OF INTERIOR MATERIAL COVERING FLOOR, SIDEWALL AND CEILING**

#### **1. Purpose**

Exchange of existing interior material covering floor, sidewall, and ceiling.

#### **2. Applicability/Eligibility**

Aeroplanes 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 23-2A Change 1

Interior material (e.g. carpets) can be replaced by new materials (e.g. carpets) under the following conditions:

- the shape is taken from the original OEM material installed in the aircraft;
- the same attachment method is used as for the OEM installation;
- impact on weight and balance needs to be considered; and
- 'flame resistant' capability of the material installed on aircraft other than gliders, motor-powered gliders, LSA, and balloons must be demonstrated. 'Flame resistant' capability can be demonstrated by:

- o compliance with 'flame resistance' requirements proven by means of FAA AC 23-2A Change 1

§8 b, or equivalent, and documented by appropriate test reports released by the material

suppliers, or

- o compliance with any other more stringent flammability tests (e.g. vertical tests of FAR/CS-25

Appendix F), or

- o successful execution of the following 'Flame Resistant' tests referenced or recorded in Guernsey Form 123:

'Flame Resistant' test

- a. Test specimens. Three specimens, approximately four-inches wide and 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 two-inches wide and 13 inches long, with the free end at least 0,5 inch from the end of frame for ignition purposes. In the case of fabrics, the direction of the weave corresponding to the most critical burn rate should be parallel to the 14-inch dimension. A minimum of 10 inches of the specimen should be used for timing purposes and approximately 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 1 inch before the burning front reaches the end of the exposed specimen.

b. Test procedure. The specimens should be supported horizontally and tested in draft-free conditions. The surface that will be exposed when installed in the aircraft, should face down for the test. The specimens should be ignited by a Bunsen or Tirrill burner. To be acceptable, the average burn rate of the three specimens must not exceed 4 inches per minute. Alternatively, if the 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 4 inches per minute burn rate.)

4. Limitations

Firewall coverings are excluded.

5. Manuals

N/a

6. Release to service

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



## **Standard Change 104a**

### **INSTALLATION OF LIGHTWEIGHT IN-FLIGHT RECORDING SYSTEMS**

#### **1. Purpose**

This SC covers inside installations of lightweight in-flight recording systems. Lightweight in-flight recording systems record flight data, cockpit audio or cockpit images, or a combination 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 SC 004, which may be applied concurrently).

This SC is not suitable for deployable<sup>5</sup> equipment.

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

#### **2. Applicability/Eligibility**

Aeroplanes 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 2 for any eligible aircraft, or
- For ELA2, SC 403a if the equipment is self-contained, has internal batteries and no external wiring, Additionally, the following applies:
- The equipment is qualified for the environmental conditions to be expected during normal operation;
- The equipment relies exclusively on its own sensors, microphones, cameras and antennas for getting data and it has no data connection to the systems, instruments or sensors of the aircraft;
- If the equipment power supply does not rely on internal batteries, it meets the electrical requirements set in Chapter 2 of FAA Advisory Circular AC 43.13-2B;
- 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 a way such that there is always sufficient memory space to record (e.g. circular recording);
  - only standard data compression is used, if any;
  - no data encryption is used;

<sup>5</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.'

- appropriate documentation to decode the recorded data is provided for free to equipment owners;
- Instructions and tests defined by the equipment manufacturer are followed.

#### 4. Limitations

- Any limitations defined by the equipment manufacturer apply.
- The maximum weight of the equipment does not exceed 300 g.
- The equipment installation cannot be used to extend the operational capability of the specific aircraft or to give credit for meeting a flight recorder carriage requirement.

#### 5. Manuals

Amend AFM with AFMS containing or referencing the equipment instructions for operation, as required. Amend ICA to establish maintenance actions/inspections and intervals, as required.

#### 6. Release to service

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

## **Standard Change 151a**

### **INSTALLATION OF HEADRESTS**

#### **1. Purpose**

A significant portion of the existing sailplane and powered-sailplane fleet is not equipped with headrests as required by newer certification specifications. The intention of this SC is to enable the simple adaption and installation of headrests and backrests with integrated headrests that are available for similar designs using established practice.

#### **2. Applicability/Eligibility**

Sailplanes and powered sailplanes as defined in ELA2.

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

- The headrest and its parts are installed and manufactured according to the design data in compliance with CS 22.788 'Headrests'.
- Modified attachments are assessed or tested against loads referred to in CS 22.788.
- Interference with controls needs to be assessed, also for the empty seat in case of a two-seater.
- Adaptions are made using established repair practices, as described in:  
the maintenance or repair manual;  
'Kleine Fiberglas Flugzeug Flickfibel' by Ursula Hänle<sup>6</sup>; and  
FAA AC 43.13-2B/1B.

#### **4. Limitations**

N/a

#### **5. Manuals**

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

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

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

<sup>6</sup> Available under <http://www.dg-flugzeugbau.de/flickfibel-d.html>. Also available in English under the title 'Plastic Plane PatchPrimer

## **Standard Change 152a**

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

#### **1. Purpose**

Installation of alternative materials in the construction of the seat cushions. For the refurbishment of seats with new seat cushions, alternative foam materials can be used.

#### **2. Applicability/Eligibility**

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

This SC is not applicable for installation in/on dynamically tested seats (according to CS 23.562 or equivalent).

Note: In case of uncertainty, check with the TC or STC holder.

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

For aeroplanes, all materials used in the construction of seat cushions must be flame resistant. Flame resistance can be demonstrated according to FAA Advisory Circular AC 23-2A, or, alternatively, such materials must pass the flammability test according to Appendix F, Part I of CS-25/ Part-25 (see FAA Advisory Circular AC 23-17C, paragraph 23.853). Each material used in the construction of seat cushions must meet the above flammability tests separately.

Materials (including foam materials) that will be used in sailplanes or powered sailplanes do not have to meet flammability requirements.

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 spine injuries in case of hard landings or minor crash landing.

Additionally, the following applies:

- The design of exchange seat cushions should follow the geometrical dimension of the original seat cushion.
- In case 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 cushion has no influence on the use of any of the controls.

#### **4. Limitations**

N/a

#### **5. Manuals**

N/a

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

This SC may be released by the Pilot-owner and only in the case of sailplanes and powered sailplanes.

## **Standard Change 153b**

### **EXCHANGE OF SAFETY BELTS/TORSO RESTRAINT SYSTEMS**

#### **1. Purpose**

Exchange of safety belts/torso restraint systems.

#### **2. Applicability/Eligibility**

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

This SC is not applicable for installation in/on dynamically tested seats (according to CS 23.562 or equivalent).

Note: In case of uncertainty, check with the TC or STC holder.

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

The following standards contain acceptable data:

— FAA Advisory Circular AC 43-13-2B, Chapter 9.

Additionally, the following applies:

- the equipment is authorised in accordance with ETSO-C22g or ETSO-C114 A1, or later amendments, or equivalent;
- the equipment is compatible with the existing installation and attachment points;
- the equipment is qualified for the environmental conditions to be expected during normal operation; and
- instructions and tests defined by the equipment manufacturer have to be followed.

#### **4. Limitations**

Any limitations defined by the equipment manufacturer apply.

#### **5. Manuals**

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

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

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

## **Standard Change 201a**

### **EXCHANGE OF POWERPLANT INSTRUMENTS**

#### **1. Purpose**

Exchange of powerplant instruments with new ones applicable to:

- temperature instruments;
- fuel and oil quantity instruments;
- fuel flowmeters;
- manifold pressure instruments;
- tachometer (RPM);
- pressure instruments; and
- carbon monoxide detector instruments.

This SC does not permit the installation of digital multifunction displays.

#### **2. Applicability/Eligibility**

Piston engine aeroplanes with MTOM below 2 730 kg and ELA2 aircraft.

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

The following standards contain acceptable data:

- FAA Advisory Circular AC 43-13-2B, Chapter 2. Additionally, the following applies:
- the instrument is authorised according to the applicable ETSO/JTSA or equivalent;
- the instrument has the same functionality, is installed at the same location, and is compatible with the existing installation;
- display of information is consistent with the overall flight deck design philosophy;
- the instrument is suitable for the environmental conditions to be expected during normal operation;
- the indicators have the required markings (e.g. limits, operating ranges) of the original instrument;
- 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;
- instructions and tests defined by the instrument manufacturer have to be followed; and
- the instrument should provide the measurement of the related magnitude in the same units as the exchanged instrument or other units when such units are used in the AFM and the related placards have been updated as necessary.

#### **4. Limitations**

Any limitations defined by the instrument manufacturer apply. Any limitations of the existing installation remain valid.

#### **5. Manuals**

Amend AFM with AFMS containing or referencing the instrument's instructions for operation, as required.

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

6. Release to service

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

## **Standard Change 202b**

### **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 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 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 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) or Mogas; or
- the engine as well as the aircraft are approved for operation with Avgas Grade 80<sup>7</sup> ; or
- the engine as well as the aircraft are approved for operation with Mogas RON95 (MON 85) in accordance with standard EN 228;
- 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:***

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

#### ***Warning 2:***

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

#### **4. Limitations**

None.

<sup>7</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 AFM with AFMS introducing the aircraft operation with unleaded Avgas UL 91.

## 6. Release to service

The Pilot-owner may release to service the aircraft after embodiment of this SC.

## **Standard Change 203b**

### **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 aircraft level is already

approved for operation with conventional Avgas or Motor 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 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 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 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) or Mogas, or;

- the engine as well as the aircraft are approved for operation with Avgas Grade 808; or

- the engine as well as the aircraft are approved for operation with Mogas RON 95 (MON 85) or RON 98 (MON 88) in accordance with standard EN 228;

- 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:***

***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 engine or lead to in-flight failure due to the lower Motor Octane Number (MON) of the fuel, compared to Avgas 100LL.***

**Warning 2:*****This SC is not intended for approving the use of automotive fuel.***

<sup>8</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 AFM with AFMS introducing the operation of unleaded Avgas Hjelmcø 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 to service the aircraft after embodiment of this SC.

## **Standard Change 204a**

### **INSTALLATION OF EXTERNAL POWERED ENGINE PREHEATER**

#### **1. Purpose**

This change 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 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 not being complex motor-powered aircraft, and piston engine powered sailplanes.

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

Installation of the preheating system in accordance with the installation instructions of the equipment manufacturer.

#### **4. Limitations**

None.

#### **5. Manuals**

Amend AFM with AFMS explaining the operation of the engine preheating system.

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

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

## **INSTALLATION OF FUEL LOW LEVEL SENSOR (FLLS)**

### **1. Purpose**

This SC covers the new installation of fuel low level sensors (FLLS) and related fuel low level caution light for aircraft not already equipped with a similar system or integral fuel tanks.

Exchange of FLLS is not covered by this SC.

### **2. Applicability/Eligibility**

ELA1 aeroplanes certified only for VFR operations.

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

The following standards contain acceptable data:

- The installation of the FLLS shall not introduce ignition source in the fuel tank and shall be installed in accordance with acceptable practices such as the aircraft maintenance manual or FAA Advisory Circulars AC 43.13-1B Chapter 8, Section 2, 'Fuel Systems' and AC 43.13-2B;
- The system shall be suitable for the environmental conditions to be expected during normal operation (fuel, electrical system, etc. ...);
- In case of multi-tank fuel system, the installation must be done at least on each tank directly feeding an engine and the fuel flow logic should be adequately considered
- Instructions and tests defined by the system manufacturer shall be followed;
- The FLLS installation shall not interfere with previously installed fuel measurement system;
- Installation of the FLLS shall be done such that the caution amber light to be installed on the instrument panel is triggered when the remaining usable fuel quantity per tank reaches the quantity needed for running the engine not less than 30 minutes at maximum continuous power per tank;
- Installation shall be verified by filling up empty fuel tank on ground with the aircraft at normal flight level attitude to measure the usable fuel quantity when the caution light is triggered. Manufacturer instructions and information, such as unusable fuel and fuel consumption at maximum power, shall be considered when calculating the remaining time before starvation. The calculated time, which should be close to 30 minutes, shall be quoted in the placard in the vicinity of the fuel low level caution light.

### **4. Limitations**

- Any limitation defined by the equipment manufacturer applies.

### **5. Manuals**

The AFMS shall, at least, contain:

- the system description, operating modes and functionality;
- limitations, warnings and placards at least for the following;

‘For situational awareness only’ and

remaining time at maximum continuous power

- emergency and normal operating procedures, as required.

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

#### 6. Release to service

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

## **Standard Change 251b**

### **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 contain acceptable data:

- FAA Memo AIR100-14-110-PM01

*Note: as an alternative to the FAA approval letter referred to in the FAA Memo, 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 applies:

- 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 or aircraft stall warning system;
- accuracy of stall indication coincides with 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 is installed in accordance with acceptable practices such as the aircraft maintenance manual or FAA Advisory Circulars AC 43.13-1B and AC 43.13-2B;
- the system is suitable for the environmental conditions to be expected during normal operation; and
- 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:

- the system description, operating modes and functionality;
- limitations, warnings and placards; and
- operating procedures.

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

#### 6. Release to service

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



## **Standard Change 401b**

### **EXCHANGE OF BASIC FLIGHT INSTRUMENTS**

#### **1. Purpose**

Exchange of basic flight instruments with equipment applicable to:

- airspeed instruments;
- turn and slip instruments;
- bank and pitch instruments;
- direction instruments;
- vertical velocity instruments; and
- pressure-actuated altimeter instruments.

This SC does not entitle the installation of digital multifunction displays. However, a combination of turn and slip with bank and pitch in one display is acceptable.

#### **2. Applicability/Eligibility**

Aeroplanes not being complex motor-powered aircraft, sailplanes including powered sailplanes or balloons being ELA2 aircraft with a maximum flight altitude below FL 280.

Rotorcraft not being complex motor-powered aircraft with single piston engine and limited to VFR day only. In the case of rotorcraft:

- if the rotorcraft is approved for NVIS, the change cannot be considered an SC;
- if the instrument is to be connected with AFCS, the change cannot be considered an SC.

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

The following standards contain acceptable data:

- FAA AC 43-13-2B, Chapter 11. Additionally, the following applies:
- the instrument is authorised according to the applicable ETSO/JTSA or equivalent;
- the instrument has the same functionality, is installed at the same location, and display of information is consistent with the overall flight deck design philosophy;
- the instrument is suitable for the environmental conditions to be expected during normal operation;
- the indicators have the required markings (e.g. limits, operating ranges) of the original instrument;
- 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;
- instructions and tests defined by the equipment manufacturer have to be followed; and
- the instrument should provide the measurement of the related magnitude in the same units as the exchanged instrument or other units when such units are used in the AFM and the related placards have been updated as necessary.

#### 4. Limitations

Any limitations defined by the instrument manufacturer apply. Any limitations of the existing installation remain valid.

#### 5. Manuals

Amend AFM with AFMS containing or referencing the instrument's instructions for operation, as required.

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

#### 6. Release to service

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

## **Standard Change 402b**

### **INSTALLATION OF SAILPLANE EQUIPMENT**

#### **1. Purpose**

Installation of gliding equipment considered as a 'standard part' (i.e. electrical variometers, bank/slip indicators ball type, total energy probes, capacity bottles (for variometers), final glide calculators, navigation computers, data loggers, barographs, cameras and bug wipers).

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

This Standard Change covers the installations of equipment which are not already described in another specific 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. Additionally, the following applies:
- the design of the equipment installation must take into account crashworthiness, arrangement and visibility, interferences with other equipment, 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 installed at a location behind the occupant(s);
- a data bus/data connectivity between the installed equipment and other equipment which is:

ETSO authorised (or equivalent), 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 exist;

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 the electrical system;
- the electrical load of the installed sailplane equipment should be considered; in case of a powered sailplane equipped with a generator by an electrical load analysis;
- a switch is required which allows to turn off the installed equipment independently;
- instructions and tests defined by the equipment manufacturer have to be followed; and
- the equipment is suitable for the environmental conditions to be expected during normal operation.

#### 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:

- the system description, operating modes and functionality;
- the limitations and, warnings;
- the emergency and normal operating procedures and limitations; and
- instructions for software and database updates.

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

#### 6. Release to service

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

## **Standard Change 403a**

### **PROVISIONS FOR THE INSTALLATION OF LIGHTWEIGHT CAMERAS**

#### **1. Purpose**

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 hand-held carry-on cameras, nor to devices worn by the pilot e.g. helmet- mounted cameras.

#### **2. Applicability/Eligibility**

ELA2 aircraft.

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

For the purpose of this SC the following definitions apply:

- ‘Installer’ means the person releasing to service the aircraft i.a.w. AMC M.A.801 (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 CAP 1369<sup>9</sup>, 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 releasing the aircraft to service i.a.w. GAR 43 Subpart C.

Additionally the following considerations apply:

- As part of applying this SC the installer shall:
  - define and record locations where a camera can be installed on the individual aircraft; and
  - list acceptable and tested camera mountings, identifiable by a part number or similar.
- For cameras mounted inside the aircraft and behind 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 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**

- Maximum mass of the camera including mountings shall not exceed 300 g.
- Maximum number of cameras installed on each wing and the empennage: 1 each.

## 5. Manuals

<sup>9</sup> The document is available at the following website: <http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7204>

The installer shall amend the AFM by an AFMS, which indicates:

- dedicated locations where cameras can be attached;
- which combination 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 ICA 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 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 release to service by the Pilot-owner.

*Note: Attaching the camera to the aircraft in accordance with the AFMS is not considered as maintenance according to GAR Part 43 and does not require a release to service, as the AFMS contains detailed instructions how to attach the camera and its mounting system.*

## **Appendix B List of Standard Repairs**

### **Standard Repair 801a**

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 with metal, composite, wood and mixed structure.

Note: Classification of the repair according to the AC is not required for SRs.

2. Applicability/Eligibility

Aeroplanes 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.

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 structure 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 manufacturers' data.

- For bonded repairs, the SR should not exceed a size above which the limit load cannot be sustained 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 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 43-13-1b should be followed.

5. Manuals

Assess if the repair could require the issuance of an AFMS.

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

6. Release to service

This SR is not suitable for release to service by the Pilot-owner.

## **Standard Repair 802b**

### **REPAIR OF SAILPLANES INCLUDING POWERED SAILPLANES, LSA AND VLA**

#### **1. Purpose**

This SR is issued to allow the use of established practice for the repair of metal, composite, wood and mixed structures of light aircraft.

#### **2. Applicability/Eligibility**

Sailplanes including powered sailplanes, as defined in ELA2, LSA, and VLA.

#### **3. Acceptable methods, techniques, and practices** Any of the following standards contain acceptable data: for composite structures: <sup>10</sup>

— ‘Kleine Fiberglas Flugzeug Flickfibel’ by Ursula Hänle<sup>10</sup>, and

for wooden and mixed structures on sailplanes including powered sailplanes:

— ‘Standard Repairs to Gliders’ by the British Gliding Association<sup>11</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>12</sup>, issued by Federation Francaise de Vol a Voile<sup>13</sup>

#### **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 paragraph 3 above is appropriate to 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 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 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.*

<sup>10</sup> Available under <http://www.dg-flugzeugbau.de/flickfibel-d.html>. Also available in English under the title ‘Plastic Plane Patch Primer’.

<sup>11</sup> Available under <https://members.gliding.co.uk/library/standard-repairs-to-gliders>

<sup>12</sup> Indice B contains changes agreed with EASA, subsequent amendments shall be used only if referred to in CS-STAN.

<sup>13</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>



## 5. Manuals

Assess if the repair could require the issuance of an AFMS.

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

## 6. Release to service

This SR is not suitable for release to service by the Pilot-owner.

## **Standard Repair 803a**

### **TEMPORARY REPAIR OF CANOPY CRACKS BY DRILLING A STOPPING-HOLE**

#### **1. Purpose**

This SR is intended to stop further growth of a crack in a transparent canopy made from acrylic glass (often known as Plexiglas) by drilling a small hole at the end of the crack to stop increase of the crack length, as a temporary repair.

#### **2. Applicability/Eligibility**

Sailplanes including powered sailplanes, as defined in ELA2, LSA, and VLA.

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

The hole diameter shall not be larger than the approximate thickness of the material (i.e. typically not larger than 2-3 mm diameter) and the centre of the hole shall be at the extension of the axis of the crack.

#### **4. Limitations**

— Where suitable TC holder-approved temporary repair data exists, this shall be applied before a SR is considered.

— Any crack repaired by a stopping-hole should be a temporary repair. An approved permanent repair should be performed as soon as practically possible to prevent further crack growth or other damage. At the latest the final repair should be performed during the next aircraft annual inspection (or the next 100 hours inspection in the case of aeroplanes);

— Repair of a crack by drilling a stopping-hole is only permitted by this SR if:  
the crack to be repaired by this SR is no longer than 10 cm (measured along the crack);

a crack with side arms (a crack splitting into several arms) must not have more than 2 arms

(2 ends) to be repaired by this SR;

in case of more than one crack, there are not more than 3 cracks with a maximum length of 5 cm each per canopy;

the crack to be repaired is not in the front section of the canopy (i.e. in the region where the pilot/co-pilot has to look through when looking forward);

a crack with side arms (a crack splitting into several arms) must not have more than 2 arms

(2 ends) to be repaired by this SR; and

#### **5. Manuals**

Supplement the pre-flight inspection to introduce an inspection of the crack for any growth until a permanent repair is embodied. If any growth of the crack at

the end of the stopping-hole is observed, then the crack should be permanently repaired by using approved repair data before further flight.

Record in the list of deferred defects the need to permanently repair the canopy at the time of the next annual check, or, in the case of aeroplanes, at the next 100 hours inspection, whichever comes first.

6. Release to service

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

## Standard Repair 804a

### USE OF ALTERNATIVE ADHESIVE 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 instruction for continued airworthiness (such as a structural repair manual) provided by the TC holder, however, it gives the possibility to use alternative adhesives.

Note: This CS shall not limit the TC or STC holder or designer to approve different adhesives for their individual applications.

#### 2. Applicability/Eligibility

Aeroplanes and sailplanes including powered sailplanes as defined in ELA 1.

#### 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 are mandatory.

#### 4. Limitation

The use of alternative adhesive 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 simultaneous application of different adhesive types with different chemical properties in one single bond location (bond on bond).

- Any adhesive complying 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 adhesive which does not fully comply or has not demonstrated conformity to EN

301-I-90-GF-1,5-M the following additional limitations apply:

This SR is not applicable for bonding of spars; main structure beam; 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 colored white, 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.

— 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 conditions shall be recorded in Guernsey Form 123 or referred documentation. This shall include adhesive type, manufacturer, charge, curing temperature.

*Note: Where there is any doubt as to whether following the references in 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 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 color marking and painting) or aero elastic characteristics. For those cases the recommendations of the references should be followed.*

## 5. Manuals

Amend ICA 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 release to service by the Pilot-owner.

**Note:** *The following, not exhaustive, list is intended to advice to known adhesive products. Compliance with this Standard Repair when using referred adhesives still need 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)*

## **Appendix C Release to Service**

### **1. Release to service and eligible persons**

Only natural or legal persons entitled to release to service an aircraft after maintenance in accordance with GAR Part 43 and GAR Part 145 are considered as an eligible installer responsible for the embodiment of a SC/SR when in compliance with applicable requirements.

Since the design of the SC/SR does not require specific approval, the natural or legal person releasing the aircraft to service after the embodiment of the change or repair takes the responsibility for compliance with this GAC and being in compliance with GAR Part 43 and/or GAR Part 145 and not in conflict with TC holders' data. This includes responsibility in respect of an adequate design, the selection/manufacturing of suitable parts and their identification, documenting the change or repair, generation or amendment of aircraft manuals and instructions as needed, embodiment of the change/repair, releasing the aircraft to service and record-keeping.

### **2. Parts and appliances to be installed as part of a SC/SR**

The design of the parts and appliances to be used in a SC/SR is considered a part of the change/repair, and, therefore, there is no need of a specific design approval. However, it is possible that for a particular SC, this GAC specifically require the use of parts and appliances that meet a technical standard. In this case, when the parts and appliances require to be authorised as an ETSO article, other articles recognised as equivalent by means of an international safety agreement. Normally, a SC/SR shall not contain specifically designed parts that should be produced by a production organisation approved in accordance with Part 21 (POA). However, in the case that the change or repair would contain such a part, it should be produced by an approved Production Organisation (POA) or equivalent, and delivered with an acceptable Authorised Release Certificate. Eligibility for installation of parts and appliances belonging to a SC/SR is subject to compliance with the GAR Part 21 and Part 43 and Part 145 related provisions, and the situation varies depending on the aircraft in/on which the SC/SR is to be embodied, and who the installer is. The need for an Authorised Release Certificate is addressed in GAR Part 21 and GAR Part 43. Furthermore maintenance organisations may be allowed to fabricate certain parts to be installed in/on the aircraft as part of their maintenance activities.

### **3. Parts and appliances identification**

The parts modified or installed during the embodiment of the SC/SR need to be permanently marked in accordance with GAR Part 21 Subpart K. Documenting the SC/SR and declaring compliance with the Certification Specifications. In

accordance with GAR Part 43 and/or GAR Part 145 the legal or natural person responsible for the embodiment of a change or a repair should compile details of the work accomplished. In the case of SCs/SRs, this includes, as necessary, based on its complexity, an engineering file containing drawings, a list of the parts and appliances used for the change or repair, supporting analysis and the results of tests performed or any other evidence suitable to show that the design fulfils the applicable Certification Specifications within this GAC together with a statement of compliance and amendments to aircraft manuals, to instructions for continuing airworthiness and to other documents such as aircraft parts list, wiring diagrams, etc., as deemed necessary. The Guernsey Form 123 is prepared for the purpose of documenting the preparation and embodiment of the SC/SR. The aircraft logbook should contain an entry referring to Guernsey Form 123; both Guernsey Form 123 and the release to service required after the embodiment of the SC/SR should be signed by the same person. Form 123 and all the records listed on it should follow elementary principles of controlled documentation, e.g. contain reference number of documents, issue dates, revision numbers, name of persons preparing/releasing the document, etc.

#### 4. Record-keeping

The legal or natural person responsible (see paragraph 1. above) for the embodiment of the change/repair should keep the records generated with the SC/SR as required by GAR Part 43 or GAR Part 145 and this GAC. In addition it is required that the aircraft owner, technical coordinator or CAMO keeps the status of the changes/repairs embodied in/on the aircraft in order to control the aircraft configuration and manage its continuing airworthiness. With regard to SCs/SRs, the information provided to the owner or CAMO may be listed in Form 123 and should include, as required, a copy of any modified aircraft manual and/or instructions for continuing airworthiness. All this information should normally be consulted when the aircraft undergoes an airworthiness review, and, therefore, a clear system to record the embodiment of SCs/SRs, which is also easily traceable, would be of help during subsequent aircraft inspections.

#### 5. Instructions for continuing airworthiness

As stipulated in GAR Part 43, the aircraft owner, technical coordinator or CAMO needs to assess if the changes in the instructions for continuing airworthiness of the aircraft require to amend the aircraft maintenance programme and to obtain its approval.

#### 6. Embodiment of more than one SC

The embodiment of two or more related SCs described in this GAC is permitted as a single change (the use of one Form 123 only) as long as adequate references

to and records of all SCs embodied are captured. Restrictions and limitations of the two (or more) SCs would apply. It is permitted to issue a single release to service containing adequate traceability of all the SCs embodied. Acceptable form to be used to record the embodiment of SCs/SRs.