



Notification of a Proposal to issue an Airworthiness Directive

PAD No.: 23-096

Issued: 17 August 2023

Note: This Proposed Airworthiness Directive (PAD) is issued by EASA, acting in accordance with Regulation (EU) 2018/1139 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 129 of that Regulation.

In accordance with the EASA Continuing Airworthiness Procedures, the Executive Director is proposing the issuance of an EASA Airworthiness Directive (AD), applicable to the aeronautical product(s) identified below.

All interested persons may send their comments, referencing the PAD Number above, to the e-mail address specified in the 'Remarks' section, prior to the consultation date indicated.

Design Approval Holder's Name:

Multiple

Part designation(s):

Turbocharger exhaust systems

Effective Date: [TBD - standard: 14 days after AD issue date]

TCDS Number(s): Multiple

Foreign AD: FAA [AD 2023-09-09](#), which was found not eligible for adoption by EASA.

Supersedure: None

ATA 78 – Exhaust – Engine / Turbocharger Exhaust System / Components – Inspection

Manufacturer(s):

See Appendix 1 of this AD (non-exhaustive list).

Applicability:

This AD applies to all turbocharged reciprocating engine-powered aircraft and turbocharged reciprocating engines, types and models that have an affected part installed, as well as to those for which an affected part is eligible for installation. Appendix 1 of this AD provides a non-exhaustive list of aircraft and engine types, models, for which an affected part may be installed. The affected part may be installed on the production line of the aircraft, or installed in service through a minor modification, field modification or Supplemental Type Certificate (STC).

This AD does not apply to aircraft and engines that are compliant with an AD as listed in Appendix 2 of this AD, as applicable.



Definitions:

For the purpose of this AD, the following definitions apply:

Affected part: Spot-welded, multi-segment v-band couplings installed at the tailpipe of the turbocharger exhaust housing flange.

Serviceable part: An affected part that is new (not previously installed); or an affected part that has not exceeded 500 flight hours (FH) since its first installation on an aircraft or engine and that, prior to (re)installation, has passed (no defect found) all inspections as specified in Appendix 3 paragraph (b) of this AD.

Groups: Group 1 aircraft are those that have an affected part installed. Group 2 aircraft are those that do not have an affected part installed.

Reason:

Failures have been reported of spot-welded, multi-segment v-band couplings, installed at the tailpipe to the turbocharger exhaust housing flange. Over the years, this has resulted in a significant number of incidents and accidents (fatal and non-fatal) on both aeroplanes and helicopters. To address this safety subject, EASA issued AD 2016-0203 for Diamond DA40 aeroplanes, while the FAA has issued multiple ADs (listed in Appendix 2 of this AD) for specific type designs, as well as several Special Airworthiness Information Bulletin (SAIB).

Since those actions, the FAA constituted a working group to study v-band coupling failures associated with turbocharged reciprocating engine-powered aircraft depending on each specific coupling type (spot-welded, riveted, or single piece). The working group's final report determined that riveted couplings are not affected by a safety concern, and concluded that the common denominator in the incidents and accidents reviewed is the spot-welded, multi-segment exhaust tailpipe v-band coupling (see Figure 1 of this AD). These couplings come in either two or three segment varieties. The segments are the number of v-retainer segments, which are attached to the outer band via spot welds. The majority of the events studied by the working group indicated fatigue failure of affected parts as a result of stress corrosion cracking that originated at or near a spot weld.

This condition, if not detected and corrected, could lead to failure of the affected part, leading to detachment of the exhaust tailpipe from the turbocharger and allowing high-temperature exhaust gases to enter the engine compartment, possibly resulting in smoke in the cockpit, in-flight fire, and loss of control of the aircraft.

Prompted by the conclusions of the working group's final report, the FAA issued SAIB [CE-18-21](#) to recommend applying the Best Practices Guide from the final report for the maintenance of turbocharged reciprocating engine-powered aircraft. In addition, to address the potential unsafe condition on the affected part, the FAA also issued AD 2023-09-09, which is not eligible for adoption by EASA (see [EASA Position](#)).

For the reasons described above, this AD is issued, introducing requirements technically equivalent to those contained in the FAA AD and with the same (wide) Applicability, to establish a life limit for



the affected part. This AD also requires repetitive inspections of each affected part and, depending on findings, accomplishment of applicable corrective action(s).

Required Action(s) and Compliance Time(s):

Required as indicated, unless accomplished previously:

Review of the Maintenance Records:

- (1) For Group 1 aircraft: Within 50 FH after the effective date of this AD, review the aircraft maintenance records to determine the FH accumulated by each affected part since its first installation on an aircraft or engine.

Affected Part Life Limit:

- (2) For Group 1 aircraft: Within the compliance times specified in Table 1 of this AD, and, thereafter, at intervals not to exceed 500 FH, remove each affected part from service and install a serviceable part, as defined in this AD, and apply correct torque, as applicable, to the affected part nut.

Figure 1 – Spot-Welded, Multi-Segment Exhaust Tailpipe V-Band Coupling

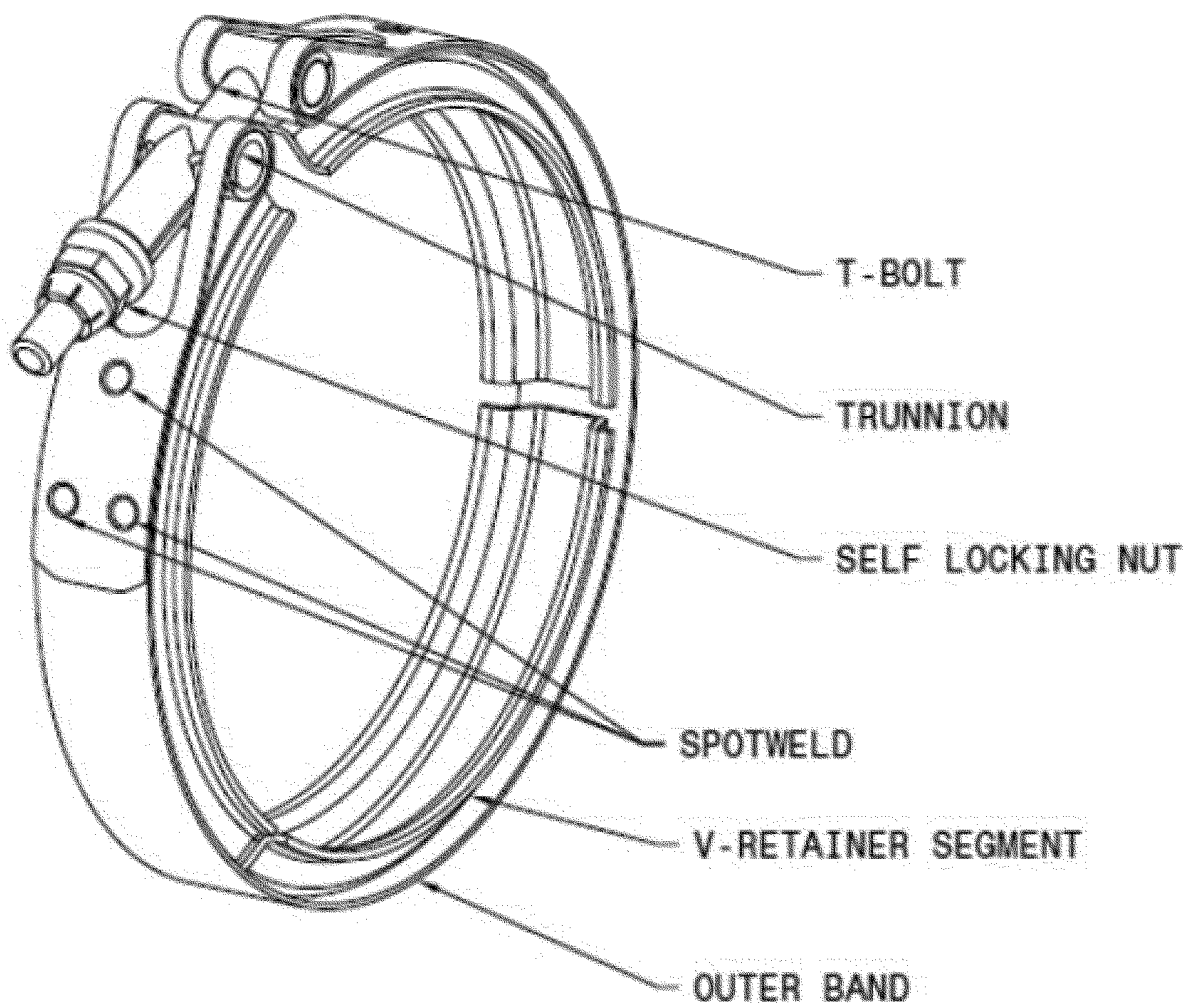


Table 1 – Affected Part Initial Replacement (see Note 1 of this AD)

FH Accumulated	Compliance Time
Less than 500 FH	Before exceeding 500 FH, or within 50 FH after the effective date of this AD, whichever occurs later.
500 FH or more	Within 50 FH after the effective date of this AD
FH not determined	

Note 1: Unless specified otherwise, the FH indicated in Table 1 of this AD are those accumulated by the affected part since its first installation on an aircraft or engine.

Alternative Method of Compliance:

(3) For Group 1 aircraft with an affected part having accumulated less than 500 FH:

As an alternative to the initial removal of this affected part from service as required by paragraph (2) of this AD, inspect the affected part as specified in Appendix 3 of this AD. The initial inspection must be accomplished not later than at the time the affected part would have been removed from service (see Table 1 of this AD) and, thereafter, inspect at intervals not to exceed 6 months or 100 FH, whichever occurs first, for a period not to exceed 2 years after the effective date of this AD.

Note 2: Instructions for installing an affected part can be found in Appendix B of Best Practices Guide, paragraph 3.1, of the “Exhaust System Turbocharger to Tailpipe Affected part/Clamp Working Group Final Report” dated January 2018 (see link in Section Ref. Publications of this AD).

Inspection(s):

(4) For Group 1 aircraft: At the next annual inspection, or within 12 months, whichever occurs first after the effective date of this AD, and, thereafter, at intervals not to exceed 12 months, inspect the affected part as specified in Appendix 3 of this AD.

Terminating Action:

(5) None.

Parts Installation:

(6) For Group 1 and Group 2 aircraft: From the effective date of this AD, it is allowed to install on any aircraft an affected part, provided it is a serviceable part, as defined in this AD, and that, following installation, the affected part is replaced as required by this AD.

Ref. Publications:

FAA [Best Practice Guide](#) for Maintaining Exhaust System Turbocharger to Tailpipe Affected parts/Clamps.

FAA SAIB [CE-03-46](#) dated 21 July 2003.

FAA SAIB [CE-04-22](#) dated 17 December 2003.



FAA SAIB [CE-05-13](#) dated 09 November 2004.

FAA SAIB [CE-09-11](#) dated 09 February 2009.

FAA SAIB [CE-10-33R1](#) dated 16 August 2010.

FAA SAIB [CE-13-07R1](#) dated 01 May 2013.

FAA SAIB [CE-13-45](#) dated 05 September 2013.

FAA SAIB [CE-18-07](#) dated 14 December 2017.

FAA SAIB [CE-18-21](#) dated 13 July 2018.

FAA SAIB [CE-18-22](#) dated 13 July 2018.

Remarks:

1. This Proposed AD will be closed for consultation on 14 September 2023.
2. Enquiries regarding this PAD should be referred to the EASA Safety Information Section, Certification Directorate. E-mail: ADs@easa.europa.eu.
3. Information about any failures, malfunctions, defects or other occurrences, which may be similar to the unsafe condition addressed by this PAD, and which may occur, or have occurred on a product, part or appliance not affected by this PAD, can be reported to the [EU aviation safety reporting system](#). This may include reporting on the same or similar components, other than those covered by the design to which this PAD applies, if the same unsafe condition can exist or may develop on an aircraft with those components installed. Such components may be installed under an FAA Parts Manufacturer Approval (PMA), Supplemental Type Certificate (STC) or other modification.
4. For any question concerning the technical content of the requirements in this PAD, please contact the aircraft design approval holder, or modification/STC approval holder, as applicable.



Appendix 1 – Affected Aircraft and Engines

The affected parts are known to be installed on, but not limited to, the following aircraft and engine types, models:

Type Certificate Holder	Type(s) and Model(s)
Aerostar Aircraft Corporation (formerly Piper Aircraft Inc., Ted Smith Aerostar)	PA-60 (Aerostar) series aeroplanes, except those modified by FAA STC SA4976NM
Britten-Norman Aircraft Ltd, (formerly B-N Group Ltd., Britten-Norman Ltd., Pilatus Britten Norman Ltd., Fairey Britten-Norman Ltd, Britten-Norman (Bembridge) Ltd)	BN2, BN2A, BN2A-6, BN2A-8, and BN2A-9 aeroplanes
Cirrus Design Corporation	SR22 and SR22T aeroplanes
Commander Aircraft Corporation (formerly CPAC Inc., Commander Aircraft Corporation, Gulfstream Aerospace Corporation, Gulfstream American Corporation, and Rockwell International - Commander Aircraft Division)	112TC, 112TCA and 114TC aeroplanes
Continental Aerospace Technologies Inc. (formerly Continental Motors Inc., Teledyne Continental Motors)	(L)TSIO-360, (TS)IO-520 and (TS)IO-550 series engines
Costruzioni Aeronautiche TECNAM S.p.A.	P2012 Traveller aeroplanes
DAHER Aerospace (formerly SOCATA, SOCATA - Groupe Aerospatiale)	TB21 aeroplanes
Diamond Aircraft Industries Inc (formerly Diamond Aircraft Industries GmbH)	DA 40 and DA 40 NG aeroplanes
Enstrom Helicopter Corporation	F-28 and 280 series helicopters
Lycoming Engines (formerly Textron Lycoming, Lycoming - AVCO Division)	(L)TO-360 and (T)IO-540 series, and LTIO-540-J2BD engines
Merlyn Products, Inc.	Twin Commander 500B, 500S and 500U aeroplanes, modified by STC SA01212SE and STC SE01211SE (Lycoming IO-540-MX1 engine)
Mooney International Corporation	M20J, M20K, M20M and M20V aeroplanes
Piper Aircraft, Inc. (formerly The New Piper Aircraft Inc., Piper Aircraft Corporation)	PA-23, PA-24, PA-28, PA-30, PA-31, PA-31P, PA-32, PA-32R, PA-34, PA-39, PA-44 and PA-46 series aeroplanes
Revo, Inc.	LA-4A, LA-4-200 and Model 250 aeroplanes
SST FLUGTECHNIK GmbH (formerly Extra Flugzeugproduktions- und Vertriebs- GmbH and Extra Flugzeugbau GmbH Flugplatz)	EA 400 aeroplanes



Textron Aviation, Inc. (formerly Hawker Beechcraft, Raytheon Aircraft Company, Beech Aircraft Corporation)	33, 35, 36 and 55 series, 56TC and A56TC (Turbo Baron), 58 and G58, 60, A60 and B60 (Duke), and 95 series aeroplanes
Textron Aviation, Inc. (formerly Cessna Aircraft Company)	182, T182, TR182, 185, A185, A188, T188, 206, P206, TP206, TU206, U206, T207, 210, P210, T210, T240, T303, 310, T310, 320, 321, 335, P337, T337, 340, 401, 402, 404, 411, 414 and 421 series aeroplanes
Textron Aviation, Inc. (formerly Reims Aviation)	FT337 aeroplanes
Twin Commander Aircraft LLC (formerly Twin Commander Aircraft Corporation, Gulfstream Aerospace Corporation, Gulfstream American Corporation, Rockwell-Standard & Associates, and Aero Design and Engineering Company, also known as Aero Commander Aircraft)	500, 500A, 500B, 500S, 500U, 560A, 560E and 685 aeroplanes
Vulcanair S.p.A. (formerly Partenavia Costruzioni Aeronautica S.p.A.)	P.68C-TC and P.68TC 'Observer' aeroplanes



Appendix 2 – Existing Related ADs

FAA [AD 81-23-03 R2](#) – Textron Aviation (Cessna) P210N aeroplanes

FAA [AD 91-21-01 R1](#) – Lycoming TIO-540-S1AD engines

FAA [AD 2000-01-16](#) – Textron Aviation (Cessna) 310, 320, 321, 340, 401, 402, 404, 411, 414 and 421 aeroplanes

FAA [AD 2000-11-04](#) – Commander 114TC aeroplanes

FAA [AD 2001-08-08](#) – Textron Aviation (Raytheon, Beechcraft) 33, 35 and 36 aeroplanes, if modified by STC SA5223NM and STC SE5222NM

FAA [AD 2004-23-17](#) – Mooney M20M aeroplanes

FAA [AD 2010-13-07](#) – Piper PA-32R-301T and PA-46-350P aeroplanes

FAA [AD 2013-10-04](#) – Piper PA-31, PA-31-325 and PA-31-350 aeroplanes

FAA [AD 2014-23-03](#) – Piper PA-31P aeroplanes

EASA [AD 2016-0203](#) – Diamond DA40 NG aeroplanes

FAA [AD 2018-06-11](#) – Textron Aviation (Raytheon, Beechcraft) A36TC and B36TC; and S35, V35, V35A and V35B aeroplanes if equipped with optional Continental TSIO-520-D engine with AiResearch turbocharger or modified by STC SA1035WE



Appendix 3 – Affected Part Inspections

(a) Inspections without Removal of the Affected Part:

Note A3.1 to paragraph (a): as an alternative to the inspections specified in this paragraph (a), it is acceptable to inspect the affected part as specified in paragraph (b) of this Appendix.

- (a.1) Visually inspect the affected part and area around the affected part for exhaust stains, soot, and discolouration. If any of those conditions are found, remove the affected part and, instead of the inspections in paragraphs (a.2) through (a.7) of this Appendix, do the inspections in paragraph (b) of this Appendix.
- (a.2) Visually inspect the affected part outer band for cracks, paying particular attention to the spot weld areas. If there is a crack, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.
- (a.3) Visually inspect the affected part for looseness and for separation of the outer band from the v-retainer segments at all spot welds. If there is any looseness or separation of the outer band from any retainer segment, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.
- (a.4) Visually inspect the affected part outer band for cupping, bowing, and crowning as depicted in Figure A3.1 of paragraph (b.4) of this Appendix. If there is any cupping, bowing, or crowning, before next flight, remove the affected part and, instead of the inspections in paragraphs (a.5) through (a.7) of this Appendix, do the inspections in paragraph (b) of this Appendix.
- (a.5) Visually inspect the area of the affected part, including the outer band, opposite the t-bolt for damage and distortion. If there is any damage or distortion, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.
- (a.6) Using a mirror, visually inspect the affected part to determine whether there is a space between the two v-retainer coupling segments next to the t-bolt. If there is no space between the two v-retainer coupling segments next to the t-bolt, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.
- (a.7) Determine whether the affected part nut is properly torqued and apply correct torque as necessary.

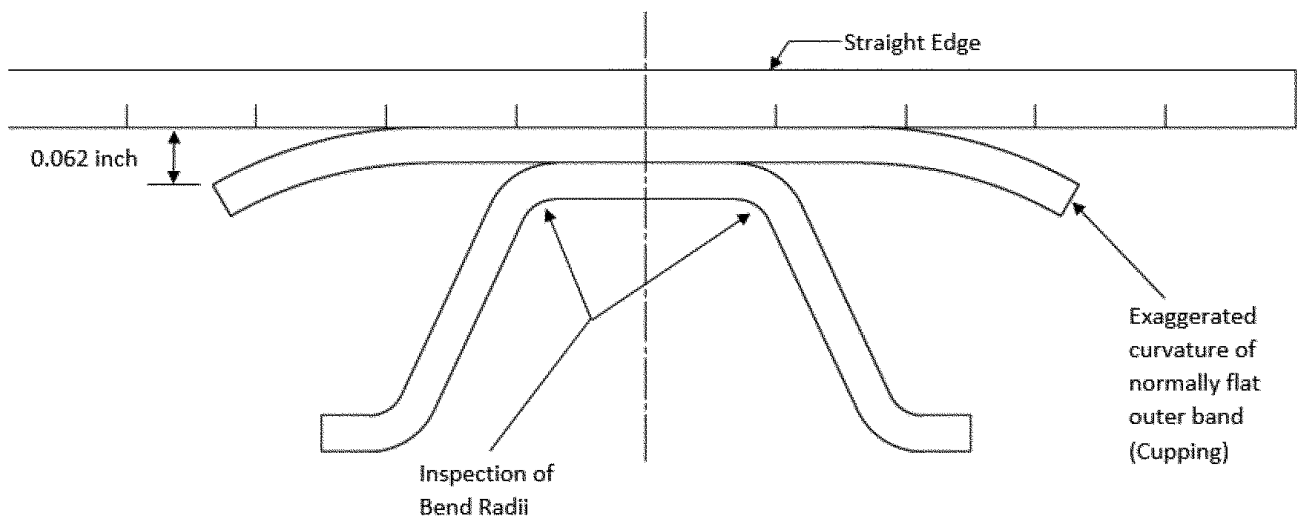
(b) Inspections with the Affected Part Removed:

- (b.1) Remove the affected part and inspect it as specified in paragraphs (b.2) through (b.7) of this Appendix.
- (b.2) Using fine abrasive cloth and mineral spirits, clean the outer band of the affected part. Pay particular attention to the spot weld areas on the affected part. If there is corrosion that cannot be removed by cleaning or if there is pitting, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.



- (b.3) Using a 10X magnifying glass, visually inspect the outer band for cracks, paying particular attention to the spot weld areas. If there is a crack, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.
- (b.4) Visually inspect the flatness of the outer band using a straight edge. Lay the straight edge across the width of the outer band as depicted in Figure A3.1 of this paragraph. If the gap between the outer band and the straight edge exceeds 0.062 inch (1,575 mm) before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.

Figure A3.1



- (b.5) With the t-bolt in the 12 o'clock position, visually inspect the attachment of the outer band to the v-retainer coupling segments for gaps between the outer band and the v-retainer coupling segments from the 1 o'clock through 11 o'clock positions. If there are any gaps between the outer band and the v-retainer coupling segments, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.

Note A3.2 to paragraph (b.4): Backlighting may be used to see gaps.

- (b.6) Visually inspect the bend radii of the v-retainer coupling segments, throughout the length of the segment, as depicted in Figure A3.1 of paragraph (b.4) of this Appendix, for cracks. If there are any cracks, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.
- (b.7) Visually inspect the outer band opposite the t-bolt for damage (distortion, creases, bulging, or cracks) caused by excessive spreading of the coupling during installation or removal. If there is any damage, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.
- (b.8) If any affected part passes all inspections specified in paragraphs (b.2) through (b.7) of this Appendix, it may be re-installed.



- (b.8.1) Apply correct torque as necessary to the affected part nut.
- (b.8.2) Inspect the affected part to determine whether there is space between the two v-retainer coupling segments next to the t-bolt. If there is no space between the two v-retainer coupling segments next to the t-bolt, before next flight, remove the affected part from service and install a serviceable part, as defined in this AD.

