



[4910-13-P]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

**[Docket No. FAA-2018-1077; Product Identifier 2018-NE-40-AD]**

**RIN 2120-AA64**

**Airworthiness Directives; Superior Air Parts, Inc. (SAP) Engines and Lycoming Engines Reciprocating Engines with a Certain SAP Crankshaft Assembly**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** The FAA proposes to adopt a new airworthiness directive (AD) for all SAP Model IO-360-series and O-360-series reciprocating engines and certain Lycoming Engines (Lycoming) Model AEIO-360-, IO-360-, and O-360-series reciprocating engines with a certain SAP crankshaft assembly installed. This SAP crankshaft assembly is installed as original equipment on the affected SAP engines and as a replacement part under parts manufacturer approval (PMA) on the affected Lycoming engines. This proposed AD was prompted by three crankshaft assembly failures that resulted in the loss of engine power and immediate or emergency landings. This proposed AD would require the removal from service of all affected crankshaft assemblies. The FAA is proposing this AD to address the unsafe condition on these products.

**DATES:** The FAA must receive comments on this proposed AD by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- Federal eRulemaking Portal: Go to <https://www.regulations.gov>. Follow the instructions for submitting comments.
- Fax: 202-493-2251.

- Mail: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

- Hand Delivery: Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

### **Examining the AD Docket**

You may examine the AD docket on the Internet at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2018-1077; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this NPRM, the regulatory evaluation, any comments received, and other information. The street address for Docket Operations is listed above. Comments will be available in the AD docket shortly after receipt.

**FOR FURTHER INFORMATION CONTACT:** Justin Carter, Aerospace Engineer, Fort Worth ACO Branch, FAA, 10101 Hillwood Parkway, Fort Worth, TX, 76177; phone: 817-222-5146; fax: 817-222-5245; email: [justin.carter@faa.gov](mailto:justin.carter@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Comments Invited**

The FAA invites you to send any written relevant data, views, or arguments about this proposal. Send your comments to an address listed under the ADDRESSES section. Include “Docket No. FAA-2018-1077; Product Identifier 2018-NE-40-AD” at the beginning of your comments. The FAA specifically invites comments on the overall regulatory, economic, environmental, and energy aspects of this NPRM. The FAA will consider all comments received by the closing date and may amend this NPRM because of those comments.

Except for Confidential Business Information as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all

comments received, without change, to <https://www.regulations.gov>, including any personal information you provide. The FAA will also post a report summarizing each substantive verbal contact received about this NPRM.

### **Confidential Business Information**

Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this NPRM, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this NPRM. Submissions containing CBI should be sent to Justin Carter, Aerospace Engineer, Fort Worth ACO Branch, FAA, 10101 Hillwood Parkway, Fort Worth, TX, 76177. Any commentary that the FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

### **Discussion**

The FAA learned of three SAP crankshaft assembly failures that took place on March 6, 2017, August 3, 2017, and October 31, 2018, that resulted in the loss of engine power and immediate or emergency landings. Since the FAA received these reports, the FAA determined that the crankshaft assembly failures resulted from the manufacturing process at SAP’s crankshaft vendor during 2012 and 2014.

The crankshaft assembly is a non-life-limited part, which should not fail (crack or separate) through fatigue. Rather, the crankshaft assembly is inspected during overhaul

and may be replaced, on-condition, due to wear beyond limits of the cam lobes and bearing surfaces.

The FAA's analysis of the process used to manufacture the failed assemblies identified that gaseous nitrocarburization resulted in excessive residual white layer forming on the assemblies. This white layer is brittle and can lead to spalling or fatigue cracking of the crankshaft assembly as a result of the normal mechanical loads during engine operation. The FAA's analysis concluded that all three SAP crankshaft assembly failures were the result of this fatigue cracking. This condition, if not addressed, could result in failure of the engine, in-flight shutdown, and loss of the airplane.

These SAP crankshaft assemblies are installed as original equipment on SAP Model IO-360-series and O-360-series reciprocating engines and as a replacement part under PMA on certain Lycoming Model AEIO-360-, IO-360-, and O-360-series reciprocating engines.

The FAA considered alternatives that may be less burdensome than removing the crankshaft assembly from service, including not taking AD action and requiring periodic inspections of the crankshaft assembly. However, these options are not acceptable because taking no action does not correct this known unsafe condition and the crankshaft assembly cannot be inspected without destroying it. The FAA concluded that there is no acceptable safety alternative to the replacement of the crankshaft assembly.

#### **FAA's Determination**

The FAA is proposing this AD because it evaluated all the relevant information and determined the unsafe condition described previously is likely to exist or develop in other products of the same type design.

#### **Proposed AD Requirements**

This proposed AD would require the removal from service of all affected crankshaft assemblies.

### **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: "General requirements." Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

This AD is issued in accordance with authority delegated by the Executive Director, Aircraft Certification Service, as authorized by FAA Order 8000.51C. In accordance with that order, issuance of ADs is normally a function of the Compliance and Airworthiness Division, but during this transition period, the Executive Director has delegated the authority to issue ADs applicable to engines, propellers, and associated appliances to the Manager, Engine and Propeller Standards Branch, Policy and Innovation Division.

### **Regulatory Flexibility Determination**

The Regulatory Flexibility Act of 1980 (Pub. L. 96-354, codified as amended at 5 USC §§ 601-612) (RFA) establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the

rationale for their actions to assure that such proposals are given serious consideration.”  
Pub. L. 96-354, § 2(b), Sept. 19, 1980. The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions. Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA. This portion of the preamble serves as the Initial Regulatory Flexibility Analysis (IRFA).

Compliance cost of this proposed AD comes from the cost to remove and replace a crankshaft assembly. The FAA estimates that this proposed AD would affect 115 crankshaft assemblies installed on airplanes of U.S. registry. This cost estimate does not include 77 SAP crankshafts installed on experimental engines since these engines are not included in the applicability of this AD. Compliance cost per crankshaft assembly is identified below.

Labor cost = 61 hours per crankshaft assembly replacement x \$85 Hourly Wage = \$5,185.

Equipment costs per crankshaft assembly replacement = \$9,636 (Source: Average of the two manufacturers).

\$5,185 labor per crankshaft assembly + \$9,636 equipment costs per crankshaft assembly replacement = \$14,821 compliance cost per engine.

The total costs to U.S. operators is \$1,704,415, or \$119,309 in annualized costs. There are no additional costs after removing and replacing the crankshaft assembly.

### **Initial Regulatory Flexibility Analysis**

Under Section 603(b) and (c) of the RFA, the initial analysis must address the following six areas:

- (1) Description of reasons the agency is considering the action;

- (2) Statement of the legal basis and objectives for the proposed rule;
- (3) Description of the record keeping and other compliance requirements of the proposed rule;
- (4) All federal rules that may duplicate, overlap, or conflict with the proposed rule;
- (5) Description and an estimated number of small entities to which the proposed rule will apply; and
- (6) Describe alternatives considered.

### **Reasons the Agency is Considering the Action**

This proposed AD was prompted by three crankshaft assembly failures that resulted in the loss of engine power and immediate or emergency landings. The FAA is proposing this AD to prevent failure of the crankshaft assembly by requiring the removal of all affected crankshaft assemblies from service. Failure of a crankshaft assembly, if not addressed, could result in failure of the engine, in-flight shutdown, and loss of the airplane.

### **Legal Basis and Objectives for the Proposed Rule**

The FAA's legal basis for this proposed AD is discussed in detail under the "Authority for this Rulemaking" section.

### **Description and an Estimated Number of Small Entities to Which the Proposed Rule Would Apply**

This proposed AD would apply to all SAP Model IO-360-series and O-360-series reciprocating engines and certain Lycoming Model AEIO-360-, IO-360-, and O-360-series reciprocating engines with a certain SAP crankshaft assembly installed. This SAP crankshaft assembly is installed as original equipment on the affected SAP engines and as a replacement part under PMA on the affected Lycoming engines. These engines are

installed on airplanes performing various activities including, but not limited to, flight training, charter flights, and agriculture.

Under the RFA, the FAA must determine whether a proposed rule significantly affects a substantial number of small entities. The FAA uses the Small Business Administration (SBA) criteria for determining whether an affected entity is small. For aircraft/engine manufacturers, aviation operators, and any business using an aircraft, the SBA criterion is 1,500 or fewer employees. The FAA estimates that this proposed AD would affect 115 crankshaft assemblies installed on airplanes of U.S. registry. The FAA does not have any information or data on whether these entities are small businesses according to the definition established by the SBA. The FAA requests comment and data that would allow us to more accurately assess the number of employees and sales revenues of the affected entities.

#### **Record-Keeping and Other Compliance Requirements of the Proposed Rule**

There are no record-keeping costs associated with this proposed rule.

#### **Duplicative, Overlapping, or Conflicting Federal Rules**

There are no relevant Federal rules that may duplicate, overlap, or conflict with this proposed rule.

#### **Alternatives to the Proposed AD**

As part of the IRFA, the FAA is required to consider regulatory alternatives that may be less burdensome. The FAA considered the following alternatives:

**Do nothing:** This option is not acceptable because the risk of additional failures of these crankshaft assemblies constitutes a known unsafe condition.

**Periodic inspections:** This option is not possible as the crankshaft assembly cannot be inspected without destroying it.



There is no direct safety alternative to the replacement of the crankshaft assembly. The replacement addresses a safety issue aimed at preventing the failure of the crankshaft assembly.

Therefore, this proposed rulemaking may have a significant economic impact on a substantial number of small entities. The FAA invites public comments regarding this determination.

### **Regulatory Findings**

The FAA determined that this proposed AD would not have federalism implications under Executive Order 13132. This proposed AD would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify this proposed regulation:

- (1) Is not a “significant regulatory action” under Executive Order 12866, and
- (2) Will not affect intrastate aviation in Alaska.

### **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

### **The Proposed Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA proposes to amend 14 CFR part 39 as follows:

### **PART 39 - AIRWORTHINESS DIRECTIVES**

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

#### **§ 39.13 [Amended]**

2. The FAA amends § 39.13 by adding the following new airworthiness directive (AD):

**Superior Air Parts, Inc.:** Docket No. FAA-2018-1077; Product Identifier 2018-NE-40-AD.

**(a) Comments Due Date**

The FAA must receive comments by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE Federal Register].

**(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to the reciprocating engine models identified in paragraphs (c)(1) and (2) of this AD with a Superior Air Parts, Inc. (SAP) crankshaft assembly, part number (P/N) SL36500-A20 or P/N SL36500-A31, with serial numbers 82976-01; 82976-02; SP12-0003 through SP12-0089, inclusive; SP13-0034 through SP13-0150, inclusive; or SP14-0151 through SP14-0202, inclusive; installed.

(1) With SAP crankshaft assembly, P/N SL36500-A20, installed:

(i) SAP Model IO-360-series and O-360-series reciprocating engines.

(ii) Lycoming Engines (Lycoming) Model IO-360-B2F, IO-360-L2A, O-360, O-360-A2A, O-360-A2D, O-360-A2E, O-360-A2F, O-360-A2G, O-360-B2A, O-360-C2A, O-360-C2C, O-360-C2D, O-360-C2E, O-360-D2A, and O-360-D2B reciprocating engines.

(2) With SAP crankshaft assembly, P/N SL36500-A31, installed:

(i) SAP Model IO-360-series and O-360-series reciprocating engines.

(ii) Lycoming Model AEIO-360-H1A, IO-360-B1A, IO-360-B1B, IO-360-B1D, IO-360-B1E, IO-360-B1F, IO-360-M1A, O-360, O-360-A1A, O-360-A1C, O-360-A1D, O-360-A2A, O-360-C1A, O-360-C1G, O-360-C1C, O-360-C1E, and O-360-C1F reciprocating engines.

Note 1 to paragraph (c) of this AD: This SAP crankshaft assembly may be installed as a replacement part under parts manufacturer approval on the affected Lycoming engines.

**(d) Subject**

Joint Aircraft System Component (JASC) Code 8520, Reciprocating Engine Power Section.

**(e) Unsafe Condition**

This AD was prompted by three crankshaft assembly failures that resulted in the loss of engine power and immediate or emergency landings. The FAA is issuing this AD to prevent failure of the crankshaft assembly. The unsafe condition, if not addressed, could result in failure of the engine, in-flight shutdown, and loss of the airplane.

**(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

**(g) Required Action**

Within 25 engine operating hours after the effective date of this AD, remove the crankshaft assembly from service.

**(h) Special Flight Permit**

A one-time special flight permit may be issued to fly the aircraft to a maintenance facility to perform the actions of this AD with the following limitations: no passengers, visual flight rules (VFR) day conditions only, and avoid areas of known turbulence.

**(i) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, Fort Worth ACO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the

manager of the certification office, send it to the attention of the person identified in paragraph (j) of this AD.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

**(j) Related Information**

For more information about this AD, contact Justin Carter, Aerospace Engineer, Fort Worth ACO Branch, FAA, 10101 Hillwood Parkway, Fort Worth, TX, 76177; phone: 817-222-5146; fax: 817-222-5245; email: justin.carter@faa.gov.

Issued in Burlington, Massachusetts, on January 23, 2020.

Karen M. Grant,  
Acting Manager, Engine and Propeller Standards Branch,  
Aircraft Certification Service.  
[FR Doc. 2020-01414 Filed: 1/28/2020 8:45 am; Publication Date: 1/29/2020]