

[Federal Register: December 31, 2009 (Volume 74, Number 250)]  
[Rules and Regulations]  
[Page 69252-69259]  
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[DOCID:fr31de09-4]

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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2008-0052; Directorate Identifier 2008-NE-01-AD; Amendment 39-16151; AD 2009-26-12]**

**RIN 2120-AA64**

#### **Airworthiness Directives; Engine Components, Inc. (ECi) Reciprocating Engine Cylinder Assemblies**

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

**ACTION:** Final rule.

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**SUMMARY:** The FAA is superseding an existing airworthiness directive (AD) for Lycoming Engines (formerly Textron Lycoming) models 320, 360, and 540 series, "Parallel Valve" reciprocating engines, with certain Engine Components, Inc. (ECi) cylinder assemblies, part number (P/N) AEL65102 series "Titan," installed. That AD currently requires initial and repetitive visual inspections and compression tests to detect cracks at the head-to-barrel interface, replacement of cylinder assemblies found cracked, and replacement of certain cylinder assemblies at new, reduced times-in-service. This AD requires the same actions, but for an expanded population of cylinder assemblies. This AD results from reports of 10 additional cylinder head separations since issuing AD 2008-19-05, on cylinder serial numbers not listed in that AD. We are issuing this AD to prevent loss of engine power due to cracks at the head-to-barrel interface and possible engine failure caused by separation of a cylinder head, which could result in loss of control of the aircraft.

**DATES:** This AD becomes effective February 4, 2010.

**ADDRESSES:** The Docket Operations office is located at Docket Management Facility, U.S. Department of Transportation, 1200 New Jersey Avenue, SE., West Building Ground Floor, Room W12-140, Washington, DC 20590-0001.

**FOR FURTHER INFORMATION CONTACT:** Peter W. Hakala, Aerospace Engineer, Special Certification Office, FAA, Rotorcraft Directorate, 2601 Meacham Blvd., Fort Worth, TX 76193; e-mail: peter.w.hakala@faa.gov; telephone (817) 222-5145; fax (817) 222-5785.

**SUPPLEMENTARY INFORMATION:** The FAA proposed to amend 14 CFR part 39 by superseding AD 2008-19-05, Amendment 39-15672 (73 FR 53105, September 15, 2008), with a

proposed AD. The proposed AD applies to Lycoming Engines (formerly Textron Lycoming) models 320, 360, and 540 series, "Parallel Valve" reciprocating engines, with certain Engine Components, Inc. (ECi) cylinder assemblies, part number (P/N) AEL65102 series "Titan," installed. We published the proposed AD in the Federal Register on July 30, 2009 (74 FR 37955). That action proposed to require initial and repetitive visual inspections and compression tests to detect cracks at the head-to-barrel interface, replacement of cylinder assemblies found cracked, and replacement of certain cylinder assemblies at new, reduced times-in-service, and for an expanded population of cylinder assemblies.

### **Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov>; or in person at the Docket Operations office between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, the regulatory evaluation, any comments received, and other information. The street address for the Docket Operations office (telephone (800) 647-5527) is provided in the ADDRESSES section. Comments will be available in the AD docket shortly after receipt.

### **Comments**

We provided the public the opportunity to participate in the development of this AD. We have considered the comments received.

Two commenters state that proposed AD paragraphs (m) and (n) are confusing and contradictory. Paragraph (m) allows repair or replacement of cylinders with leakage provided that the cylinder is not cracked, but paragraph (n) prohibits removed cylinders from being re-installed.

We agree. We changed paragraph (m) to state "For Group 'A' cylinder assemblies only, repair or replace the engine cylinder assembly before further flight if the cause of the low gauge reading in paragraph (k) of this AD is from leaking intake or exhaust valves, or from leaking piston rings." We also changed paragraph (n) to state, "After the effective date of this AD, do not install any Group 'B' ECi cylinder assembly, P/N AEL65102, onto any engine and do not attempt to repair or reuse Group 'B' cylinder assemblies."

### **Conclusion**

We have carefully reviewed the available data, including the comments received, and determined that air safety and the public interest require adopting the AD with the changes described previously. We have determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

### **Costs of Compliance**

We estimate that this AD will affect about 18,000 ECi cylinder assemblies installed in aircraft of U.S. registry. The visual inspection and compression tests will take about 4 work-hours for each engine. An individual cylinder replacement will require \$1,100 for parts and 6 work-hours. Lycoming engines with a set of 4 ECi cylinders will require 12 work-hours for the cylinder replacement. Lycoming engines with a set of 6 ECi cylinders will require 16 work-hours for the cylinder replacement. We estimate 18 percent of the affected population of cylinders will be replaced. We estimate the total cost of the AD to U.S. operators to be \$10,172,000. Our estimate is exclusive of any possible warranty coverage.

## **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.

We are 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.

## **Regulatory Findings**

We have determined that this AD will not have federalism implications under Executive Order 13132. This AD will 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 that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866;
- (2) Is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

We prepared a summary of the costs to comply with this AD and placed it in the AD Docket. You may get a copy of this summary at the address listed under ADDRESSES.

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

Air transportation, Aircraft, Aviation safety, Safety.

## **Adoption of the Amendment**

Accordingly, under the authority delegated to me by the Administrator, the Federal Aviation Administration amends 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 removing Amendment 39-39-15672 (73 FR 53105, September 15, 2008), and by adding a new airworthiness directive, Amendment 39-16151, to read as follows:



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**2009-26-12 Engine Components, Inc. (ECi):** Amendment 39-16151. Docket No. FAA-2008-0052; Directorate Identifier 2008-NE-01-AD.

**Effective Date**

- (a) This airworthiness directive (AD) becomes effective February 4, 2010.

**Affected ADs**

- (b) This AD supersedes AD 2008-19-05, Amendment 39-15672.

**Applicability**

(c) If your engine has not been overhauled, or not had any cylinder assemblies replaced since new, no further action is required.

(d) This AD applies to the Lycoming Engines (formerly Textron Lycoming) models 320, 360, and 540 series, "Parallel Valve," reciprocating engines listed in Table 1 of this AD, with ECi cylinder assembly, part number (P/N) AEL65102 series "Titan," and with cylinder head, P/N AEL85099, installed.

(1) The applicable cylinder assembly serial numbers (S/Ns) are S/N 1138-02 through S/N 35171-22 (referred to in this AD as Group "A" cylinder assemblies); and

(2) S/N 35239-01 through S/N 42179-30 (referred to in this AD as Group "B" cylinder assemblies).

(3) The cylinder assembly P/N is at the crankcase end of the cylinder assembly, and might be difficult to see. As a guide in determining if your cylinder assemblies are affected, all affected cylinder assemblies have cylinder head P/N AEL85099. The cylinder head P/N is at the top of the cylinder head, near the intake and exhaust valve springs, and is easier to locate than the cylinder assembly P/N.

(4) The set of numbers appearing on the cylinder, above and to the left of the S/N, in the form of "123456" is not used for determining this AD's applicability.

**Table 1–Engine Models**

<b>Cylinder Assembly Part Number:</b>	<b>Installed on Engine Models:</b>
AEL65102-NST04	<p><b>O-320-A1B, A2B, A2C, A2D, A3A, A3B, B2B, B2C, B2D, B2E, B3B, B3C, C2B, C2C, C3B, C3C, D1A, D1AD, D1B, D1C, D1D, D1F, D2A, D2B, D2C, D2F, D2G, D2H, D2J, D3G, E1A, E1B, E1C, E1F, E1J, E2A, E2B, E2C, E2D, E2E, E2F, E2G, E2H, E3D, E3H</b></p> <p><b>IO-320-A1A, A2A, B1A, B1B, B1C, B1D, B1E, B2A, D1A, D1AD, D1B, D1C, E1A, E1B, E2A, E2B</b></p> <p><b>AEIO-320-D1B, D2B, E1A, E1B, E2A, E2B</b></p> <p><b>AIO-320-A1A, A1B, A2A, A2B, B1B, C1B</b></p> <p><b>LIO-320-B1A</b></p>
AEL65102-NST05	<p><b>IO-320-C1A, C1B, C1F, F1A</b></p> <p><b>LIO-320-C1A</b></p>
AEL65102-NST06	<p><b>O-320-A1A, A2A, A2B, A2C, A3A, A3B, A3C, E1A, E1B, E2A, E2C, (also, an O-320 model with no suffix)</b></p> <p><b>IO-320-A1A, A2A</b></p>
AEL65102-NST07	<p><b>IO-320- B1A, B1B</b></p> <p><b>LIO-320- B1A</b></p>
AEL65102-NST08	<p><b>O-320-B1A, B1B, B2A, B2B, B3A, B3B, B3C, C1A, C1B, C2A, C2B, C3A, C3B, C3C, D1A, D1B, D2A, D2B, D2C</b></p>
AEL65102-NST10	<p><b>O-360-A1A, A1C, A1D, A2A, A2E, A3A, A3D, A4A, B1A, B1B, B2A, B2B, C1A, C1C, C1G, C2A, C2B, C2C, C2D, D1A, D2A, D2B</b></p> <p><b>IO-360-B1A, B1B, B1C</b></p> <p><b>HO-360-A1A, B1A, B1B</b></p> <p><b>HIO-360-B1A, B1B</b></p> <p><b>AEIO-360-B1B</b></p> <p><b>O-540-A1A, A1A5, A1B5, A1C5, A1D, A1D5, A2B, A3D5, A4A5, A4B5, A4C5, A4D5, B1A5, B1B5, B1D5, B2A5, B2B5, B2C5, B4A5, B4B5, D1A5, E1A, E4A5, E4B5, E4C5, F1A5, F1B5, G1A5, G2A5</b></p> <p><b>IO-540-C1B5, C1C5, C2C, C4B5, C4B5D, C4C5, D4A5, D4B5, N1A5</b></p>

AEL65102-NST12	<p><b>O-360-</b> A1A, A1AD, A1D, A1F, A1F6, A1F6D, A1G, A1G6, A1G6D, A1H, A1H6, A1J, A1LD, A1P, A2A, A2D, A2F, A2G, A2H, A3A, A3AD, A3D, A4A, A4AD, A4D, A4G, A4J, A4JD, A4K, A4M, A4N, A4P, A5AD, B1A, B2C, C1A, C1C, C1E, C1F, C1G, C2A, C2B, C2C, C2D, C2E, C4F, C4P, D2A, F1A6, G1A6</p> <p><b>HO-360</b> –C1A</p> <p><b>LO-360-</b>A1G6D, A1H6</p> <p><b>HIO-360-</b>B1A, B1B, G1A</p> <p><b>LTO-360-</b>A1A6D</p> <p><b>TO-360-</b>A1A6D</p> <p><b>IO-360-</b>B1B, B1BD, B1D, B1E, B1F, B1F6, B1G6, B2E, B2F, B2F6, B4A, E1A, L2A, M1A, M1B</p> <p><b>AEIO-360-</b>B1B, B1D, B1E, B1F, B1F6, B1G6, B1H, B2F, B2F6, B4A, H1A, H1B</p> <p><b>O-540-</b>A4D5, B2B5, B2C5, B2C5D, B4B5, B4B5D, E4A5, E4B5, E4C5, G1A5, G2A5, H1A5, H1A5D, H1B5, H1B5D, H2A5, H2A5D, H2B5D</p> <p><b>IO-540-</b>C4B5, C4B5D, C4D5, C4D5D, D4A5, D4B5, D4C5, N1A5, N1A5D, T4A5D, T4B5, T4B5D, T4C5D, V4A5, V4A5D</p> <p><b>AEIO-540-</b>D4A5, D4B5, D4C5, D4D5</p>
AEL65102-NST26	<p><b>IO-540-</b>J4A5, R1A5</p> <p><b>TIO-540-</b>C1A, E1A, G1A, H1A</p>
AEL65102-NST38	<p><b>IO-360-</b>F1A</p> <p><b>TIO-540-</b>AA1AD, AB1AD, AB1BD, AF1A, AG1A, AK1A, C1A, C1AD, K1AD</p> <p><b>LTIO-540-</b>K1AD</p>
AEL65102-NST43	<p><b>O-360-</b>J2A</p> <p><b>O-540-</b>F1B5, J1A5D, J1B5D, J1C5D, J1D5D, J2A5D, J2B5D, J2C5D, J2D5D, J3A5, J3A5D, J3C5D</p> <p><b>IO-540-</b>AB1A5, W1A5, W1A5D, W3A5D</p>
AEL65102-NST44	<p><b>O-540-</b>L3C5D</p>

The Lycoming Engines (formerly Textron Lycoming) models 320, 360, and 540 series, “Parallel Valve”, reciprocating engines are installed on, but not limited to, the aircraft listed in the following Table 2:

**Table 2–Engines Installed on, but Not Limited To**

<b>Engine Models:</b>	<b>Installed on , But Not Limited To:</b>
O-320-A1A	Piper Aircraft: Tri-Pacer (PA-22 “150”, PA-22S “150”), Apache (PA-23), Pawnee (PA-25)

	<p>Doyn Aircraft: Doyn-Cessna (170, 170A, 170B)</p> <p>Mooney Aircraft: Mark (20A)</p> <p>Dinfia: Ranquel (1A-46)</p> <p>Simmering-Graz Pauker: Flamingo (SGP-M-222)</p> <p>Aviamilano: Scricciolo (P-19)</p> <p>Vos Helicopter Co.: Spring Bok</p>
O-320-A1B	<p>Piper Aircraft: Tri-Pacer (PA-22 “150”, PA-22S “150”), Apache (PA-23)</p> <p>Doyn Aircraft: Doyn-Cessna (170, 170A, 170B)</p> <p>S.O.C.A.T.A.: Horizon (Gardan)</p>
O-320-A2A	<p>Piper Aircraft: Tri-Pacer (PA-22 “150”, PA-22S “150”), Agriculture (PA-18A “150”), Super Cub (PA -18 “150”), Caribbean (PA-22 “150”), Pawnee (PA-25)</p> <p>Intermountain Mfg. Co.: Call Air Texas (A-5, A-5T)</p> <p>Lake Aircraft: Colonial (C-1)</p> <p>Rawdon Bros.: Rawdon (T-1, T-15, T-15D)</p> <p>Shinn Engineering: Shinn (2150-A)</p> <p>Dinfia: Ranquel (1A)46)</p> <p>Neiva: (1PD-5802)</p> <p>Sud: Gardan-Horizon (GY-80)</p> <p>LaVerda: Falco (F8L Series II, America)</p> <p>Malmo: Vipar (MF1-10)</p> <p>Kingsford Smith: Autocrat (SCRM-153)</p> <p>Aero Commander: 100</p>
O-320-A2B	<p>Piper Aircraft: Tri-Pacer (PA-22 “150”, PA-22S “150”), Cherokee (PA-28 “150”), Super Cub (PA -18 “150”)</p> <p>Champion Aircraft: Challenger (7GCA, 7GCB, 7KC), Citabria (7GCAA, 7GCRC), Agriculture (7GCBA)</p> <p>Beagle: Pup (150)</p> <p>Artic: Interstate S1B2</p> <p>Robinson: R-22</p> <p>Varga: Kachina 2150A</p>
O-320-A2C	<p>Robinson: R-22</p> <p>Cicare: Cicare AG</p> <p>Bellanca Aircraft: Citabria 150 (7GCAA), Citabria 150S (7GCBC)</p>
O-320-A2D	<p>Piper Aircraft: Apache (PA-23)</p>
O-320-A3A	<p>Doyn Aircraft: Doyn-Cessna (170, 170A, 170B)</p>

	Corben-Fettes: Globe Special (Globe GC-1B)
O-320-A3B	Piper Aircraft: Apache (PA-23) Doyn Aircraft: Doyn-Cessna (170, 170A, 170B) Teal II: TSC (1A2)
O-320-B1A	Piper Aircraft: Apache (PA-23 “160”) Doyn Aircraft: Doyn-Cessna (170, 170A, 170B) Malmo: Vipar (MF1-10)
O-320-B1B	Piper Aircraft: Apache (PA-23 “160”) Doyn Aircraft: Doyn-Cessna (170, 170A, 170B)
O-320-B2A	Piper Aircraft: Tri-Pacer (PA-22 “160”, PA-22S “160”)
O-320-B2B	Piper Aircraft: Tri-Pacer (PA-22 “160”, PA-22S “160”) Beagle: Airedale (D5-160) Fuji-Heavy Industries: Fuji (F-200) Uirapuru: Aerotec 122
O-320-B2C	Robinson: R-22
O-320-B2D	Maule: MX-7-160
O-320-B2E	Lycon
O-320-B3A	Piper Aircraft: Apache (PA-23 “160”) Doyn Aircraft: Doyn-Cessna (170, 170A, 170B)
O-320-B3B	Piper Aircraft: Apache (PA-23 “160”) Doyn Aircraft: Doyn-Cessna (170, 170A, 170B) Sud: Gardan (GY80-160)
O-320-C1A	Piper Aircraft: Apache (PA-23 “160”) Riley Aircraft: Rayjay (Apache)
O-320-C1B	Piper Aircraft: Apache (PA-23 “160”)
O-320-C3A	Piper Aircraft: Apache (PA-23 “160”)
O-320-C3B	Piper Aircraft: Apache (PA-23 “160”)
O-320-D1A	Sud: Gardan (GY-80) Gyroflug: Speed Cancard Grob: G115
O-320-D1F	Slingsby: T67 Firefly
O-320-D2A	Piper Aircraft: Cherokee (PA-28S “160”) Robin: Major (DR400-140B), Chevalier (DR-360), (R-3140) S.O.C.A.T.A.: Tampico TB9 Slingsby: T67C Firefly



	Daetwyler: MD-3-160
	Nash Aircraft Ltd.: Petrel
	Aviolight: P66D Delta
	General Avia: Pinguino
O-320-D2B	Beech Aircraft: Musketeer (M-23) Piper Aircraft: Cherokee (PA-28 “160”)
O-320-D2J	Cessna Aircraft: Skyhawk 172
O-320-D3G	Piper Aircraft: Warrior II, Cadet (PA-28-161)
O-320-E1A	Grob: G115
O-320-E1C	M.B.B. (Messerschmitt-Boelkow-Blohm): Monsun (BO-209-B)
O-320-E1F	M.B.B.: Monsun (BO-209-B)
O-320-E2A	Piper Aircraft: Cherokee (PA-28 “140”, PA-28 “150”) Robin: Major (DR-340), Sitar, Bagheera (GY-100-135) S.O.C.A.T.A.: Super Rallye (MS-886), Rallye Commodore (MS-892) Siai-Marchetti: (S-202) F.F.A.: Bravo (AS-202/15) Partenavia: Oscar (P66B), Bucker (131 APM) Aeromot: Paulistina P-56 Pezetel: Koliber 150
O-320-E2C	Beech Aircraft: Musketeer III (M -23III) M.B.B.: Monsun (BO-209-B)
O-320-E2D	Cessna Aircraft: Cardinal (172-I, 177)
O-320-E2F	M.B.B.: Monsun (BO-209-B), Wassmer Pacific (WA-51)
O-320-E2G	American Aviation Corp.: Traveler
O-320-E3D	Piper Aircraft: Cherokee (140) Beech Aircraft: Sport
IO-320-B2A	Piper Aircraft: Twin Comanche (PA-30)
IO-320-B1C	Hi. Shear: Wing
IO-320-B1D	Ted Smith Aircraft: Aerostar
IO-320-C1A	Piper Aircraft: Twin Comanche (PA-30 Turbo)
IO-320-D1A	M.B.B.: Monsun (BO-209-C)
IO-320-D1B	M.B.B.: Monsun (BO-209-C)
IO-320-E1A	M.B.B.: Monsun (BO-209-C)
IO-320-E1B	Bellanca Aircraft

IO-320-E2A	Champion Aircraft: Citabria
IO-320-E2B	Bellanca Aircraft
IO-320-F1A	CAAR Engineering: Carr Midget
LIO-320-B1A	Piper Aircraft: Twin Comanche (PA-39)
LIO-320-C1A	Piper Aircraft: Twin Comanche (PA-39)
AIO-320-B1B	M.B.B.: Monsun (BO-209-C)
AEIO-320-D1B	Slingsby: T67M Firefly
AEIO-320-D2B	Hindustan Aeronautics Ltd.: HT-2
AEIO-320-E1A	Bellanca Aircraft Champion Aircraft
AEIO-320-E1B	Bellanca Aircraft Champion Aircraft: Decathalon (8KCAB-CS)
AEIO-320-E2B	Bellanca Aircraft Champion Aircraft: Decathalon (8KCAB)
O-320-A1A	Riley Aircraft: Riley Twin
O-360-A1A	Beech Aircraft: Travel Air (95, B-95) Piper Aircraft: Comanche (PA-24) Intermountain Mfg. Co.: Call Air (A-6) Lake Aircraft: Colonial (C-2, LA -4, 4A or 4P) Doyn Aircraft: Doyn-Cessna (170B, 172, 172A, 172B) Mooney Aircraft: Mark "20B" (M-20B) Earl Horton: Pawnee (Piper PA-25) Dinfia: Ranquel (1A-51) Neiva: (1PD-5901) Regente: (N-591) Wassmer: Super 4 (WA-50A), Sancy (WA-40), Baladou (WA-40), Pariou (WA-40) Sud: Gardan (GY-180) Bolkow: (207) Partenavia: Oscar (P-66) Siai-Marchetti: (S-205) Procaer: Picchio (F-15-A) S.A.A.B.: Safir (91-D) Malmo: Vipar (MF-10B) Aero Boero: AB-180

	Beagle: Airedale (A-109)
	DeHavilland: Drover (DHA-3MK3)
	Kingsford-Smith: Bushmaster (J5-6)
	Aero Engine Service Ltd.: Victa (R-2)
O-360-A1AD	S.O.C.A.T.A.: Tabago TB-10
O-360-A1D	Piper Aircraft: Comanche (PA-24)
	Lake Aircraft: Colonial (LA -4, 4A or 4P)
	Doyn Aircraft: Doyn-Beech (Beech 95)
	Mooney Aircraft: Master "21" (M-20E), Mark "20B", "20D", (M20B, M20C), Mooney Statesman (M-20G)
	Dinfia: Querandi (1A-45)
	Wassmer: (WA-50)
	Malmo: Vipar (MF1-10)
	Cessna Aircraft: Skyhawk
	Doyn Aircraft: Doyn-Piper (PA-23 "160")
O-360-A1F6	Cessna Aircraft: Cardinal
O-360-A1F6D	Cessna Aircraft: Cardinal 177
	Teal III: TSC (1A3)
O-360-A1G6	Aero Commander
O-360-A1G6D	Beech Aircraft: Duchess 76
O-360-A1H6	Piper Aircraft: Seminole (PA-44)
O-360-A1LD	Wassmer: Europa WA-52
O-360-A1P	Aviat: Husky
O-360-A2A	Center Est Aeronautique: Regente (DR-253)
	S.O.C.A.T.A.: Rallye Commodore (MS-893)
	Societe Aeronautique Normande: Mousquetaire (D-140)
	Bolkow: Klemm (K1-107C)
	Partenavia: Oscar (P-66)
	Beagle: Husky (D5-180) (J1-U)
O-360-A2D	Piper Aircraft: Comanche (PA-24), Cherokee "C" (PA-28 "180")
	Mooney Aircraft: Master "21" (M-20D), Mark "21" (M-20E)
O-360-A2E	Std. Helicopter
O-360-A2F	Aero Commander: Lark (100)
	Cessna Aircraft: Cardinal
O-360-A2G	Beech Aircraft: Sport

O-360-A3A	C.A.A.R.P.S.A.N.: (M-23III) Societe Aeronautique Normande: Jodel (D-140C) Robin: Regent (DR400/180), Remorqueur (DR400/180R), R-3170 S.O.C.A.T.A.: Rallye 180GT, Sportavia Sportsman (RS-180) Norman Aeroplance Co.: NAC-1 Freelance Nash Aircraft Ltd.: Petrel
O-360-A3AD	S.O.C.A.T.A.: TB-10 Robin: Aiglou (R-1180T)
O-360-A4A	Piper Aircraft: Cherokee "D" (PA-28 "180")
O-360-A4D	Varga: Kachina
O-360-A4G	Beech Aircraft: Musketeer Custom III
O-360-A4K	Grumman American: Tiger Beech Aircraft: Sundowner 180
O-360-A4M	Piper Aircraft: Archer II (PA-28 "18") Valmet: PIK-23
O-360-A4N	Cessna Aircraft: 172 (Optional)
O-360-A4P	Penn Yan: Super Cub Conversion
O-360-A5AD	C. Itoh and Co.: Fuji FA-200
O-360-B2C	Seabird Aviation: SB7L
O-360-C1A	Intermountain Mfg. Co.: Call Air (A-6)
O-360-C1E	Bellanca Aircraft: Scout (8GCBC-CS)
O-360-C1F	Maule: Star Rocket MX-7-180
O-360-C1G	Christen: Husky (A-1)
O-360-C2B	Hughes Tool Co.: (269A)
O-360-C2D	Hughes Tool Co.: (269A)
O-360-C2E	Hughes Tool Co.: (YHO-2HU) Military Bellanca Aircraft: Scout (8GCBC FP)
O-360-C4F	Maule: MX-7-180A
O-360-C4P	Penn Yan: Super Cub Conversion
O-360-F1A6	Cessna Aircraft: Cutlass RG
O-360-J2A	Robinson: R22
IO-360-B1A	Beech Aircraft: Travel-Air (B-95A) Doyn Aircraft: Doyn-Piper (PA-23 "200")
IO-360-B1B	Beech Aircraft: Travel-Air (B-95B) Doyn Aircraft: Doyn-Piper (PA-23 "200")

Fuji: (FA-200)	
IO-360-B1D	United Consultants: See-Bee
IO-360-B1E	Piper Aircraft: Arrow (PA-28 “180R”)
IO-360-B1F	Utva: 75
IO-360-B2E	C.A.A.R.P. C.A.P. (10)
IO-360-B1F6	Great Lakes: Trainer
IO-360-B1G6	American Blimp: Spector 42
IO-360-B2F6	Great Lakes: Trainer
LO-360-A1G6D	Beech Aircraft: Duchess
LO-360-A1H6	Piper Aircraft: Seminole (PA-44)
IO-360-E1A	T.R. Smith Aircraft: Aerostar
IO-360-L2A	Cessna Aircraft: Skyhawk C-172
IO-360-M1A	Diamond Aircraft: DA-40
IO-360-M1B	Vans Aircraft: RV6, RV7, RV8 Lancair: 360
AEIO-360-B1F	F.F.A.: Bravo (200) Grob: G115/Sport-Acro
AEIO-360-B1G6	Great Lakes
AEIO-360-B2F	Mundry: CAP-10
AEIO-360-B4A	Pitts: S-1S
AEIO-360-H1A	Bellanca Aircraft: Super Decathlon (8KCAB-180)
AEIO-360-H1B	American Champion: Super Decathlon
VO-360-A1A	Brantly Hynes Helicopter: (B-2)
VO-360-A1B	Brantly Hynes Helicopter: (B-2, B2-A). Military (YHO-3BR)
VO-360-B1A	Brantly Hynes Helicopter: (B-2, B2-A)
IVO-360-A1A	Brantly Hynes Helicopter: (B2-B)
HO-360-B1A	Hughes Tool Co.: (269A)
HO-360-B1B	Hughes Tool Co.: (269A)
HO-360-C1A	Schweizer: (300C)
HIO-360-B1A	Hughes Tool Co.: Military (269-A-1), (TH-55A)
HIO-360-B1B	Hughes Tool Co.: (269A)
HIO-360-G1A	Schweizer: (CB)
O-540-A1A	Rhein-Flugzeugbau: (RF-1)
O-540-A1A5	Piper Aircraft: Comanche (PA-24 “180”) Helio: Military (H-250)

Yoeman Aviation: (YA-1)	
O-540-A1B5	Piper Aircraft: Aztec (PA-23 “250”), Comanche (PA-24 “250”)
O-540-A1C5	Piper Aircraft: Comanche (PA-24 “250”)
O-540-A1D	Found Bros.: (FBA-2C) Dornier: (DO-28-B1)
O-540-A1D5	Piper Aircraft: Aztec (PA-23 “250”), Comanche (PA-24 “250”), Military Aztec (U-11A) Dornier: (DO-28)
O-540-A2B	Aero Commander: (500) Mid-States Mfg. Co.: Twin Courier (H-500), (U-5)
O-540-A3D5	Piper Aircraft: Navy Aztec (PA-23 “250”)
O-540-B1A5	Piper Aircraft: Apache (PA-23 “235”)
O-540-B1B5	Piper Aircraft: Comanche (PA-24 “250”) Doyn Aircraft: Doyn-Piper (PA-24 “250”)
O-540-B1D5	Wassmer: (WA-421)
O-540-B2B5	Piper Aircraft: Pawnee (PA-25 “235”), Cherokee (PA-28 “235”), Aztec (PA-23 “235”) Intermountain Mfg. Co.: Call Air (A-9) Rawdon Bros.: Rawdon (T-1) S.O.C.A.T.A.: Rallye 235CA
O-540-B2C5	Piper Aircraft: Pawnee (PA-25 “235”)
O-540-B4B5	Piper Aircraft: Cherokee (PA-28 “235”) Embraer: Corioca (EMB-710) S.O.C.A.T.A.: Rallye 235GT, Rallye 235C Maule: Star Rocket (MX-7-235), Super Rocket (M-6-235), Super Std. Rocket (M-7-235)
O-540-E4A5	Piper Aircraft: Comanche (PA-24 “260”) Aviamilano: Flamingo (F-250) Siai-Marchetti: (SF-260), (SF-208)
O-540-E4B5	Britten-Norman: (BN-2) Piper Aircraft: Cherokee Six (PA-32 “260”)
O-540-E4C5	Pilatus Britten-Norman: Islander (BN-2A-26), Islander (BN-2A- 27), Islander II (BN-2B-26), Islander (BN-2A-21), Trislander (BN- 2A-Mark III-2)
O-540-F1B5	Omega Aircraft: (BS-12D1) Robinson: (R-44)
O-540-G1A5	Piper Aircraft: Pawnee (PA-25 “260”)

O-540-H1B5D	Aero Boero: 260
O-540-H2A5	Embraer: Impanema “AG” Gippsland: GA-200
O-540-H2B5D	Aero Boero: 260
O-540-J1A5D	Maule: Star Rocket (MX-7-235), Super Rocket (M-6-235), Super Std. Rocket (M-7-235)
O-540-J3A5	Robin: R-3000/235
O-540-J3A5D	Piper Aircraft: Dakota (PA-28-236)
O-540-J3C5D	Cessna Aircraft: Skylane RG
O-540-L3C5D	Cessna Aircraft: TR-182, Turbo Skylane RG
IO-540-C1B5	Piper Aircraft: Aztec B (PA-23 “250”), Comanche (PA-24 “250”)
IO-540-C1C5	Riley Aircraft: Turbo-Rocket
IO-540-C4B5	Piper Aircraft: Aztec C (PA-23 “250”), Aztec F Wassmer: (WA4-21) Avions Pierre Robin: (HR100/250) Bellanca Aircraft: Aries T-250 Aerofab: Renegade 250
IO-540-C4D5	S.O.C.A.T.A.: TB-20
IO-540-C4D5D	S.O.C.A.T.A.: Trinidad TB-20
IO-540-D4A5	Piper Aircraft: Comanche (PA-24 “260”) Siai-Marchetti: (SF-260)
IO-540-D4B5	Cerva: (CE-43 Guepard)
IO-540-J4A5	Piper Aircraft: Aztec (PA-23 “250”)
IO-540-R1A5	Piper Aircraft: Comanche (PA-24)
IO-540-T4A5D	General Aviation: Model 114
IO-540-T4B5	Commander: 114B
IO-540-T4B5D	Rockwell: 114
IO-540-T4C5D	Lake Aircraft: Seawolf
IO-540-V4A5	Maule: MT-7-260, M -7-260 Aircraft Manufacturing Factory
IO-540-V4A5D	Brooklands: Scoutmaster
IO-540-W1A5	Maule: MX-7-235, MT-7-235, M7-235
IO-540-W1A5D	Maule: Star Rocket (MX-7-235), Super Rocket (M-6-235), Super Std. Rocket (M-7-235)
IO-540-W3A5D	Schweizer: Power Glider
AEIO-540-D4A5	Christen: Pitts (S-2S), S-2B)

	Siai-Marchetti: SF-260
	H.A.L.: HPT-32
	Slingsby: Firefly T3A
AEIO-540-D4B5	Moravan: Zlin-50L
	H.A.L.: HPT-32
AEIO-540-D4D5	Burkhart Grob: Grob G, 115T Aero
TIO-540-C1A	Piper Aircraft: Turbo Aztec (PA-23-250)
TIO-540-K1AD	Piper Aircraft
TIO-540-AA1AD	Aerofab Inc.: Turbo Renegade (270)
TIO-540-AB1AD	S.O.C.A.T.A.: Trinidad TC TB-21
TIO-540-AB1BD	Schweizer
TIO-540-AF1A	Mooney Aircraft: "TLS" M20M
TIO-540-AG1A	Commander Aircraft: 114TC
TIO-540-AK1A	Cessna Aircraft: Turbo Skylane T182T
LTIO-540-K1AD	Piper Aircraft

### Unsafe Condition

(e) This AD results from reports of 10 additional cylinder head separations since issuing AD 2008-19-05, on cylinder S/Ns not listed in that AD. We are issuing this AD to prevent loss of engine power due to cracks at the head-to-barrel interface in the cylinder assemblies and possible engine failure caused by separation of a cylinder head, which could result in loss of control of the aircraft.

### Compliance

(f) You are responsible for having the actions required by this AD performed within the compliance times specified unless the actions have already been done.

### Engines Overhauled or Cylinder Assemblies Replaced Since New

(g) If your engine was overhauled or had a cylinder assembly replaced since new, do the following:

(1) Before further flight, inspect the maintenance records and engine logbook to determine if the overhaul or repair facility installed ECi cylinder assemblies, P/N AEL65102, with cylinder head, PN AEL85099, S/N 1138-02 through S/N 35171-22, or S/N 35239-01 through S/N 42179-30, in your engine.

(2) If your cylinder assemblies are not ECi, P/N AEL65102, no further action is required.

(3) If your cylinder assemblies are ECi, P/N AEL65102, but the S/N is not listed in this AD, no further action is required.

(4) If the cylinder assemblies are ECi, P/N AEL65102, and if the S/N is listed in this AD, do the following:



## **Group "A" Cylinder Assemblies; S/N 1138-02 Through S/N 35171-22**

(i) For Group "A" cylinder assemblies:

(A) Perform an initial visual inspection as specified in paragraphs (h) through (i) of this AD, and an initial compression test as specified in paragraphs (j) through (m) of this AD, within the next 10 operating hours time-in-service (TIS), if the cylinder assembly has 350 or more operating hours TIS on the effective date of this AD, but fewer than 2,000 operating hours TIS.

(B) Perform an initial visual inspection as specified in paragraphs (h) through (i) of this AD, and an initial compression test as specified in paragraphs (j) through (m) of this AD, within the next 10 operating hours TIS, or before exceeding 350 operating hours TIS, whichever occurs later, if the cylinder assembly has fewer than 350 operating hours TIS on the effective date of this AD.

(C) Replace cylinder assemblies installed in helicopter engines within the next 25 operating hours TIS after the effective date of this AD if the cylinder assembly has 1,500 operating hours TIS or more on the effective date of this AD.

(D) Replace cylinder assemblies installed in airplane engines within the next 25 operating hours TIS after the effective date of this AD if the cylinder assembly has 2,000 operating hours TIS or more on the effective date of this AD.

(E) Perform repetitive visual inspections as specified in paragraphs (h) through (i) of this AD, and repetitive compression tests as specified in paragraphs (j) through (m) of this AD, within every 50 operating hours TIS.

(F) Replace cylinder assemblies installed in helicopter engines that pass the visual inspections and compression tests, no later than 1,500 operating hours TIS after the effective date of this AD.

(G) Replace cylinder assemblies installed in airplane engines that pass the visual inspections and compression tests, no later than 2,000 operating hours TIS after the effective date of this AD.

## **Group "B" Cylinder Assemblies; S/N 35239-01 through S/N 42179-30**

(ii) For Group "B" cylinder assemblies:

(A) Perform an initial visual inspection as specified in paragraphs (h) through (i) of this AD, and initial compression test as specified in paragraphs (j) through (l) of this AD, within the next 10 operating hours TIS.

(B) Replace the cylinder assembly within the next 25 operating hours TIS after the effective date of this AD if the cylinder assembly has 350 or more operating hours TIS on the effective date of this AD.

(C) Replace cylinder assemblies that pass the initial visual inspections and compression tests, before exceeding 350 operating hours TIS after the effective date of this AD.

### **Visual Inspection**

(h) Visually inspect each cylinder head around the exhaust valve side for cracks or any signs of black or white residue of combustion leakage from cracks.

(i) Replace cracked cylinder assemblies before further flight.

### **Cylinder Assembly Compression Test**

(j) Perform a standard cylinder differential compression test.

(k) During the compression test, if the cylinder pressure gauge reads below 70 pounds-per-square-inch, apply a water and soap solution to the side of the leaking cylinder, near the head-to-barrel interface.

(l) Replace the cylinder assembly before further flight if air leakage and bubbles are observed on the side of the cylinder assembly, near the head-to-barrel interface.

(m) For Group "A" cylinder assemblies only, repair or replace the engine cylinder assembly before further flight if the cause of the low gauge reading in paragraph (k) of this AD is from leaking intake or exhaust valves, or from leaking piston rings.

#### **Prohibition of Group "B" ECi Cylinder Assemblies Affected by This AD**

(n) After the effective date of this AD, do not install any Group "B" ECi cylinder assembly, P/N AEL65102, onto any engine and do not attempt to repair or reuse Group "B" cylinder assemblies.

#### **Alternative Methods of Compliance**

(o) The Manager, Special Certification Office, has the authority to approve alternative methods of compliance for this AD if requested using the procedures found in 14 CFR 39.19.

#### **Special Flight Permits**

(p) Under 14 CFR 39.23, we will not approve special flight permits for this AD for engines that have failed the visual inspection or the cylinder assembly compression test required by this AD.

#### **Related Information**

(q) Contact Peter W. Hakala, Aerospace Engineer, Special Certification Office, FAA, Rotorcraft Directorate, 2601 Meacham Blvd., Fort Worth, TX 76193; e-mail: peter.w.hakala@faa.gov; telephone (817) 222-5145; fax (817) 222-5785, for more information about this AD.

Issued in Burlington, Massachusetts, on December 22, 2009.

Peter A. White,

Assistant Manager, Engine and Propeller Directorate, Aircraft Certification Service.

[FR Doc. E9-30732 Filed 12-30-09; 8:45 am]