

Maintenance alerts

Check your bearings

THE RELIABILITY of piston engine main and big-end bearings for horizontally opposed engines rated over 300 horsepower has been in the spotlight recently. Concern about the composition and reliability of bearings by maintainers and operators, has seen an increased focus on bearing origin and resilience.

The operation of bearings is relatively simple. Journals ride on an oil film (called hydrodynamic lubrication) and do not touch the bearing during operation. However, without adequate oil flow to the bearing, the oil film is ruptured and the journal and the bearing make contact.

Bearing construction: The plain bearings used in the connecting-rod and main-journal areas in traditional aircraft piston engines are multi-layered (predominately tri-metal) bearings constructed of steel on which multiple layers of various metals are applied. In general, the cast steel bearing shell is treated to a sintered or electroplated layer of copper-lead or copper-tin, often referred to as bronze. The steel shell and copper-lead or bronze layer is used for strength while providing good heat transfer characteristics.

Over this layer, a 0.020-inch coating of nickel is applied. Then the bearing is plated with a soft 0.0015-inch layer of a lead, tin and copper alloy, followed by a 0.020-inch layer of lead-tin. The nickel layer is used to isolate the softer alloys of lead, tin and copper from the harder copper-bronze alloy attached to the steel shell. It also provides a strong bond between the two.

A soft material (called babbitt) is used on the surface of the bearing because normal manufacturing tolerances allow for some inconsistencies in the fit between a bearing and its journal. The soft material provides a malleable medium in which the crankshaft can mould itself while suspended on a film of oil.

The babbitt metal will also accept a measure of oil-suspended contaminant by



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capturing the debris and burying the impurity in its soft layers. This protects the crankshaft from scoring when a contaminant is large enough to compromise the fit, as well as protecting the underlying layers of copper and bronze from oxidation (rust), to which copper alloys are prone when exposed to the acids suspended in the engine's oil.

The soft babbitt metal will wear away slightly during break-in and seating while the crankshaft "settles" into its journal. This wear is minimal and entirely normal. Measuring the loss with conventional shop equipment is not possible. That's why plain bearings of this type are usually scrutinised for their look rather than using any criteria based on dimensional checks.

According to a bearing manufacturer, bearing failures fall into 14 broad categories: surface fatigue; foreign particles in lining; foreign particles in bearing back; out-of-round bore; excessive crush; insufficient crush; bent or twisted connecting

rod; shifted bearing cap; distorted crankcase; bent crankshaft; out-of-shape journal; fillet ride; oil starvation; and poor assembly.

Next time you replace bearings, take a moment and think about some of the faults listed above. The appearance of the bearing can reveal the cause of damaging action. Once we know the damaging action, we can rule out possible causes and take appropriate, corrective action.

Frictional forces melt the babbitt until the bearing shell starts to extrude from the side of the journal. Excessive clearance can cause various failure modes. For example, connecting-rod bolts can pound, leading eventually to failure due to fatigue.

Information from www.lightplane-maintenance.com and www.sacskyranch.com/eng219.htm

Harness condition

A HELICOPTER pilot recently had a lucky escape when he was forced to auto-rotate

into trees. Although he sustained only minor injuries, the pilot's left shoulder harness had failed. Had the impact been harder, the consequences could have been much worse. Subsequent tests on the harness revealed that its strength was less than 20 per cent of the design-rated load. The harness was manufactured 30 years ago.

There are inspection and maintenance procedures for seatbelts, but they cannot be tested. Once a big load is applied, the damage to the webbing, although undetectable, reduces the restraint's strength.

The main dangers to nylon restraint webbing are ultraviolet light, contaminants and abrasion and other mechanical damage.

Ultraviolet light: Long-term exposure to sunlight degrades nylon seatbelts because high-energy ultraviolet light breaks chemical bonds in the material. The effect is like sunburn. Ultraviolet rays can penetrate aircraft canopies, especially at high altitude, where the protection of the atmosphere is lessened. Although webbing is tested for resistance to light, there is a limit.

Contaminants: Oils, fuels and agricultural chemicals can damage the restraint fibres. Even suntan lotion and sweat can affect the material.

Mechanical damage: Each time you strap in, the webbing rubs over the inertia reel guide and/or the edge of the seat cushion. Sharp edges can catch and break threads or cut the edge of the webbing. These cuts

can reduce webbing strength significantly, because much of the load is taken at the webbing edges.

The restraint will not work if the attachment pulls away. Loose, worn or corroded fittings sometimes escape maintenance inspections.

Restraints are like other safety equipment – not needed until they are needed. When you do your pre-flight, check the seatbelts for wear, condition and cleanliness. However, ultraviolet light damage to nylon fibres is not always apparent.

For more information, see AWB 25-2, Issue 1 at www.casa.gov.au/aircraft/awb

Lifejacket lights

AEROPLANE operators flouting procedures on lifejacket survivor-locator lights could be dashing hopes of rescue after emergency ditchings in water.

All lifejackets approved for use in Australian aircraft are fitted with the lights, approved to FAA TSO-C85. The lights automatically activate when their battery containers come into contact with water through specially designed holes in the battery casing.

To keep moisture out during shipment, the holes are plugged. But once the seals are removed, moisture in the air causes the batteries to discharge.

The life of the battery is reduced severely, especially in tropical climates. In some cases the lifespan may be less than the life

jacket's overhaul period.

This is no problem in airlines because the jackets are usually sealed in a valise in the aircraft cabin. However, in flights such as off-shore helicopter operations, during which jackets are worn continuously and the humidity is high, the batteries could deteriorate quickly.

To overcome the problem, some operators have been leaving the plugs installed in the battery packs. This is unsafe. The lights would not activate if the wearer wound up in the water. In the heat of an emergency ditching, the last thing pilots or passengers need is to have to remove the lifejacket plugs.

Headset repairs

CASA has issued a direction clarifying requirements for the repair of headsets.

The direction, instrument no. 271/03, can be found at www.casa.gov.au/avreg/rules/miscinst/

The direction says that headsets that are not listed in the aircraft illustrated parts catalogue are deemed not to be an aircraft component, and therefore do not need to have a release note before use.

The effect of the direction is that pilot-supplied headsets and headsets used by passengers of light aircraft will not need to be repaired by an approved workshop, and issued a release note by an authorised person. Use of these headsets will require the approval of the aircraft owner.

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Australian Civil Aviation Safety Authority Approved

AirBorne make a range of two seater microlights, from the basic Redback model (based on the Edge-X) to the fully optioned electric start Edge-X with oil injection. Whatever your preference there is nothing to compare to the comfort and handling of the AirBorne trike range.



Dual radiators



Oil injection



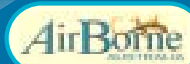
Dash layout with MicroAir



The NEW
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Airworthiness Directives, Airworthiness Advisory Circulars and Airworthiness Bulletins

ADs AL 4/2003, 17 April 2003

Part 39-105 - Lighter Than Air

There are no amendments to Part 39-105 - Lighter than Air this issue

Part 39-105 - Rotorcraft

Agusta A109 Series Helicopters

AD/A109/33 - Main Rotor Blade Tip Cap - 2

AD/A109/34 - Windshield Wipers

AD/A109/35 - Hydraulic Hoses

AD/A109/36 - Damper Assembly of Main Rotor Hub

AD/A109/37 - Tail Rotor Blades P/N 109-8132-01-111

Eurocopter AS 355 (Twin Ecureuil) Series Helicopters

AD/AS 355/67 Amdt 1 - Main Gearbox Lubrication Pump

Eurocopter EC 135 Series Helicopters

AD/EC 135/9 - Main Rotor Hydraulic Actuators - CANCELLED

Eurocopter SA 360 and SA 365 (Dauphin) Series Helicopters

AD/DAUPHIN/64 - Fuel - Air Vent Hoses

Robinson R22 Series Helicopters

AD/R22/50 - Tail Rotor Pitch Control Assembly

Robinson R44 Series Helicopters

AD/R44/17 - Tail Rotor Pitch Control Assembly

AD/R44/18 - Main Rotor Blades

Sikorsky S-76 Series Helicopters

AD/S-76/71 - Rotor Brake Disc

ADs AL 5/2003, 15 May 2003

Part 39-105 - Lighter Than Air

There are no amendments to Part 39-105 - Lighter than Air this issue

Part 39-105 - Rotorcraft

Agusta A109 Series Helicopters

AD/A109/38 - Tail Rotor Blades

AD/A109/39 - Hydraulic Pump

AD/A109/40 - Engine Exhaust Ejectors

Bell Helicopter Textron Canada (BHTC) 206 and Agusta Bell 206 Series Helicopters

AD/BELL 206/91 Amdt 1 - Longer P/N 206-031-314 - Inspection and Repair

Eurocopter AS 332 (Super Puma) Series Helicopters

AD/S-PUMA/48 - Hydraulic Reservoir Fittings

Schweizer (Hughes) 269 Series Helicopters

AD/HU 269/26 Amdt 16 - Retirement life

- Critical Components

AD/HU 269/57 Amdt 3 - Centre Frame

Aft Cluster Fitting

Part 39-105 - Below 5700kg

Airparts (NZ) Ltd. FU 24 Series

Aeroplanes

AD/FU 24/1 Amdt 2 - Elevator Control

Cables and Pulleys - Inspection

Beechcraft 200 (Super King Air) Series Aeroplanes

AD/BEECH 200/21 Amdt 11 - Fuselage

Fatigue Life Limitation

See www.casa.gov.au/avreg/aircraft/ for more information.

ADs AL 6/2003, 12 June 2003

Part 39-105 - Lighter Than Air

There are no amendments to Part 39-105 - Lighter than Air this issue

Part 39-105 - Rotorcraft

Agusta A109 Series Helicopters

AD/A109/41 - Main Rotor Rotating

Scissor Assy

AD/A109/42 - Passenger Compartment

Sliding Door

Eurocopter SA 360 and SA 365 (Dauphin) Series Helicopters

AD/DAUPHIN/27 Amdt 5 - Tail Rotor

Blades

AD/DAUPHIN/61 - Tail Rotor Blades -

CANCELLED

McDonnell Douglas (Hughes) & Kawasaki 369 Series Helicopters

AD/HU369/111 - Tail Rotor Blade Pitch

Horn

Robinson R22 Series Helicopters

AD/R22/24 Amdt 1 - Lower Actuator

Bearing Mounting Brackets

Part 39-105 - Below 5700 kgs

Airtractor AT 300, 400 and 500 Series Aeroplanes

AD/AT/22 Amdt 1 - Wing Centreline

Splice Joint

Beechcraft 200 (Super King Air) Series Aeroplanes

AD/BEECH 200/65 Amdt 1 - Fuselage

Frame

Cessna 120 and 140 Series Aeroplanes

AD/CESSNA 120/10 - Fuel Selector

Valve

Diamond DA40 Series Aeroplanes

AD/DA40/1 - Mixture Control Cable

Embraer EMB-110 (Bandeirante) Series Aeroplanes

AD/EMB-110/31 Amdt 7 - Cracking of

Horizontal Stabiliser Attachment Fittings

Part 39-105 - Above 5700kg

Boeing 737 Series Aeroplanes

AD/B737/211 - Forward Pressure

Bulkhead - 2

British Aerospace BAe 125 Series Aeroplanes

AD/HS125/169 - Wheel Tie-Bolt Nuts

British Aerospace BAe 146 Series Aeroplanes

AD/BAe 146/23 Amdt 2 - IDG Generator

In-Line Splices - CANCELLED

AD/BAe 146/24 Amdt 2 - APU Generator

In-Line Splices - CANCELLED

AD/BAe 146/104 - APU and IDG In-Line Splices

Fokker F50 (F27 Mk 50) Series Aeroplanes

AD/F50/83 - Grimes Aerospace

Passenger Service Units

British Aerospace BAe 3100 (Jetstream) Series Aeroplanes

AD/JETSTREAM/95 - Steering Actuator

Piston Rod Cracking

British Aerospace (Hawker Siddeley) HS748 Series Aeroplanes

AD/HS748/32 - Port and Starboard

Wing Dry Bays Electrical Looms and

Fuel Cross-Feed Drains

SAAB SF340 Series Aeroplanes

AD/SF340/88 - Main Landing Gear

Separation Bolt Electrical Harness -

CANCELLED

AD/SF340/91 - Main Landing Gear

Separation Bolt Electrical Harness

Replacement

Part 39-106 - Piston Engines

There are no amendments to Part 39-106 Piston Engines series this issue

Part 39-106 - Turbine Engines

General Electric Turbine Engines - CT 7 Series

AD/CT7/9 - Compressor Variable

Geometry Schedule

Part 39-107 - Equipment

Instruments and Automatic Pilots

AD/INST/49 Amdt 1 - Rockwell Collins

Air Data Computers

Restraint Equipment

AD/RES/33 Amdt 1 - Anjou

Aeronautique Restraint Systems

AACs Issue AL 6/2003, 12 June 2003

There are no amendments to AAC's this issue.

ADs AL 7/2003, 10 July 2003

Part 39-105 - Lighter Than Air

There are no amendments to Part 39-105 - Lighter than Air this issue

Part 39-105 - Rotorcraft

Agusta A109 Series Helicopters

AD/A109/43 - Passenger Compartment

Sliding Doors Installation

AD/A109/44 - Main Transmission

Support Fittings

Eurocopter AS 332 (Super Puma) Series Helicopters

AD/S-PUMA/49 - Pilot Cyclic Stick

Stops

Eurocopter AS 350 (Ecureuil) Series Helicopters

AD/ECUREUIL/70 Amdt 1 - Main

Servocontrol Rods

AD/ECUREUIL/84 - Hydraulic Fluid

AD/ECUREUIL/85 - Exhaust Duct and

Fuel Line Interference

AD/ECUREUIL/86 - Horizontal Situation Indicator

AD/ECUREUIL/87 - Main Rotor

STARFLEX Star

AD/ECUREUIL/88 - Collective Pitch

Lever Friction Mechanism

Eurocopter AS 355 (Twin Ecureuil) Series Helicopters

AD/AS355/64 Amdt 1 - Main

Servocontrol Rods

Schweizer (Hughes) HU-269 Series Helicopters

AD/HU269/110 Amdt 1 - Tail Rotor Fork

Bolt

Sikorsky S-76 Series Helicopters

AD/S-76/8 Amdt 11 - Retirement Lives

Part 39-105 - Below 5700 kgs

Aerostar (Piper/Ted Smith) 600 and 700 Series Aeroplanes

AD/TSA-600/48 - Oil Scavenge Pumps

Airtractor AT 300, 400 and 500 Series Aeroplanes

AD/AT/25 - Vertical Fin Front Spar Fitting

Cessna 120 and 140 Series Aeroplanes

AD/CESSNA 120/11 - Primer Line

Cessna 150, F150, 152, & F152 Series Aeroplanes

AD/CESSNA 150/23 Amdt 2 - Pre-

Certification Requirements - CAN-

CELLED

Cessna 400 Series Aeroplanes

AD/CESSNA 400/111 - Fuel Boost Pump

Wiring - CANCELLED

AD/CESSNA 400/112 - Fuel Boost Pump

Wiring

DHC-2 (Beaver) Series Aeroplanes

AD/DHC-2/27 Amdt 2 - Horizontal

Stabiliser Front Spar

AD/DHC-2/33 - Exhaust Collector Ring

Segments

Extra EA-300 Series Aeroplanes

AD/EXTRA/8 - Fuel Selector Valve

Leakage

Mitsubishi MU-2 Series Aeroplanes

AD/MU-2/70 - Pneumatic Lines

Pilatus Britten-Norman BN-2 Series Aeroplanes

AD/BN-2/77 - Access Panel Bolts

AD/BN-2/78 - Control Rod to Elevator

Trim Tab Lever Bolt Retainer

Pilatus Britten-Norman BN-2A Mk III (Trislander) Series Aeroplanes

AD/BNT/53 - Access Panel Bolts

PZL M18 Dromader Series Aeroplanes

AD/PZL/6 - Inspection of Safety Belts

Twin Commander (Gulfstream/ Rockwell/Aerocommander 500, 600 and 700) Series Aeroplanes

AD/AC/99 - Wing and Fuselage

Structure

Part 39-105 - Above 5700 kgs

AMD Falcon 50 and 900 Series
Aeroplanes
AD/AMD 50/31 - Hydraulic Line Chafing

Beechcraft 1900 Series Aeroplanes

AD/BEECH 1900/40 - Fuselage Rivets

Boeing 737 Series Aeroplanes

AD/B737/212 - Landing Gear
Parts/Records
AD/B737/213 - Fuselage Lap Joints

Boeing 747 Series Aeroplanes

AD/B747/290 - Trailing Edge Flap
Actuator Attach Fittings - 2

Boeing 767 Series Aeroplanes

AD/B767/184 - In-Flight Entertainment
System - FAA STC ST01783AT-D
Bombardier (Boeing Canada/de
Havilland) DHC-8 Series Aeroplanes
AD/DHC-8/92 - RDS86 Weather Radar
Circuit Breakers

British Aerospace BAe 125 Series Aeroplanes

AD/HS 125/170 - Wing and Fuselage
Attachment Bolts

British Aerospace BAe 146 Series Aeroplanes

AD/BAe 146/105 - APU - Air Inlet Duct -
Modification

Fokker F27 Series Aeroplanes

AD/F27/155 - Aileron Spring Tab
Balance Unit

Israel Aircraft Industries 1125 (Astra) Series Aeroplanes

AD/IAI-A/16 Amdt 1 - Main Landing
Gear Door
SAAB SF340 Series Aeroplanes
AD/SF 340/92 - Refuelling Door
AD/SF 340/93 - Engine Bottom Mounts

Part 39-106 - Piston Engines

There are no amendments to Part 39-
106 Piston Engines series this issue

Part 39-106 - Turbine Engines

Honeywell International Turbine Engines - T5508D Series

AD/T5508D/1 - Inner Bevel Gear
AD/T5508D/2 - Compressor Bleed
Bands
AD/T5508D/3 - 1st Stage Turbine Disk

Walter Turbine Engines - M601 Series

AD/M601/2 - Combustion Chamber
Inner Liner

Part 39-107 - Equipment

Parachute Equipment

AD/PARA/9 - Emergency Parachute
Opening Mechanism

Propellers - Variable Pitch - Hartzell

AD/PHZL/77 Amdt 1 - Australian Air
Props
AD/PHZL/78 - Anti-ice Boots
AD/PHZL/79 - Propeller Vibration
Placard

Propellers - Variable Pitch - McCauley

AD/PMC/47 Amdt 1 - Australian Air
Props

Radio Communication and Navigation Equipment

AD/RAD/61 - GPS Installation for Non-
Precision Approaches - CANCELLED

AACs Issue AL 7/2003, 10 July 2003

Part 9 - AME Licensing and Examination

AAC 9-4 Issue 11 -Acceptance of
Training Courses Conducted by
Overseas Equipment Manufacturers,
Operators and Training Organisations.
AAC 9-5 Issue 9 -AME Specific Type
Training Courses and Examinations
Conducted by Approved Australian
Operators, Maintenance and Training
Organisations.

Airworthiness Bulletins-12 June 2003

0-002 INTERNATIONAL AOC HOLDER
AIRCRAFT OVERSEAS MAINTENANCE

0-003 Fokker F28 070/100 (MRBD)
Maintenance Review Board Document

0-004 Service Difficulty Reporting
System

0-005 Depleted Uranium in Aircraft

0-006 Micro Switch Maintenance

0-007 Circuit Breaker Resetting
Procedures

0-008 Item 21.8 of Master Minimum
Equipment List (MMEL) applicable to
Beech model 200 series and F-90 air-
craft

0-009 Inappropriate Systems of
Maintenance

0-010 Equivalency of Tooling and Test
Equipment

0-011 Expired Certificates of
Airworthiness

0-012 Authorised Release Certificate -
Form 917

0-013 Approved Data - Agusta - Bell
47G-2A1 and 47G-3B1

1-002 Alemite Corporation Grease
Fitting Pt No. 1992B1

1-003 Total Airframe & Turbine
Corporation

1-004 Hamilton Standard propeller hubs
- model 2D30

1-005 Engine Generator Rotor Shaft -
Applicable Boeing 747

1-006 Improperly Heat Treated
Aluminum Parts

1-007 Military Parts NOT TO BE Fitted to
Civil BO 105 or MBB BK-117 Helicopters

1-008 Use of Unapproved Parts from
Surplus Military Inventory on Civil Bell
206B Helicopters

1-009 Short Brothers SD3-60 series air-
craft Brake Rotor Segments (AHM
8252)

1-010 Pratt & Whitney JT3D & JT8D
Critical Rotating Engine Parts

1-011 Parts Distributed by Panavia
s.r.l.

1-012 Parts Manufactured by MTU for
Rolls Royce 250 Series Engines

1-013 Parts Returned to Service by
Marchini Instruments Corporation

1-014 Turbine engine thermocouple
probes - part No. 6855381

1-015 General Electric (GE) CT7 Gas
Turbine Engines

2-001 ON - CONDITION MAINTENANCE

2-003 Requirements of Airworthiness
Limitations Section

2-004 Transit Authorisation

2-005 Administration and Control of
Aircraft Welding and Non - Destructive
Testing

2-002 Inadvertent Operation of
Emergency Beacon

12-001 Aircraft Servicing and Ground
Handling Tasks

12-002 Alternate Cleaning Product for
Aircraft Oxygen Systems

20-001 Spark Plug Care

21-001 Cabin Altitude Alert Pressure
Switch Maintenance Requirements

23-001 Aircraft Radio Station Licence

24-001 Starter Generator Electrical
Discharge Damage

24-002 Aircraft Alternator Alert

24-003 Mechanical Products 3 Phase
Circuit Breaker - Incorrect Marking

25-001 Aircraft Seats

25-002 Inspection and replacement of
seat belts and harnesses

25-003 Cirrus SR20/SR22 Aircraft
Parachute System (CAPS)

27-001 Control Cable Terminal
Inspection

27-002 Bell Helicopter - Faulty Pitch
Link Barrels

27-003 Cessna 336/337 Flap Cable
Wear

28-001 Fuel Tank Safety

29-002 Biological contamination hy-
draulic fluid systems

30-001 Pitot/Static and Venturi Care

31-001 Flight Data Recorder
Requirements

31-002 CRT Displays

32-030 Emergency undercarriage "blow-

down" systems

33-001 EMB 120 Cabin Lighting with
Bruce Lights

34-001 GPS Navigation Database
Maintenance

34-002 Ground Proximity Systems
Recommended Maintenance

34-003 King Radar Altimeter
Incompatibility

34-004 Warning Against Pitot Static
Probe Repairs

34-005 Direct reading magnetic com-
passes

34-006 Transponder Maintenance

34-007 Erroneous Air Data Indications

35-001 Passenger Oxygen Mask
Pressure Switch Maintenance
Requirements

51-001 Aircraft Fabric Coverings

51-001 Aircraft Fabric Coverings

51-002 Partenavia Wing Spars

51-003 Cessna 150/152 Series Aircraft
Horizontal Stabiliser Spar Cracking

51-004 Piper PA30/39 Wing Spar Cap
Corrosion

53-001 Schweizer (Hughes) 269 Pre
Flight Inspections on Aft Cluster Fittings

55-001 Horizontal Stabilisers - Cessna
200 series

55-002 Piper Spar Corrosion

57-001 Wing Corrosion Cessna 100 se-
ries

61-001 Hamilton Sunstrand Propellers
Cracked Blade Retaining Rings P/N
794345

61-002 Hartzell - Feathering Propeller
Air Charge Reduction. HC-SL-61-197

62-001 ,BK 117 Helicopter - Main Rotor
Vibration

63-001 Robinson R22 Clutch Shaft
Failure

63-002 Bell 206 One-Way Clutch
Failures - Lubricating Oil Orifice

74-001 Teledyne Continental Motors
D2000/3000 Dual Magnetos

75-001 Cooling Fans in Piston Engine
Helicopters

79-001 Spectrographic Oil Analysis
Program (SOAP)

85-001 Textron Lycoming Engines

See www.casa.gov.au/aircraft/
for more information.