Feedback

Canadian Aviation Service Difficulty Reports

The following content was published between 1 January 2023 and 31 July 2023. The full accessible version of each article is available on the Feedback website.

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Fixed Wing

Cessna, 172N

Smoke in the Cabin – Landing Light Switch Failure

SDR #: 20190311024

Subject:

During the flight, the pilot reported smoke emanating from under the instrument panel. Upon inspection, it was discovered that the landing light switch had overheated, partially melting. These landing light switches have a mandatory replacement life of 48 months. The failed landing light switch was due for replacement on 16 August 2020.

Transport Canada Comments:

Similar On 24 September 2007, a Cessna 152 took off from Oshawa Municipal Airport with the pilot and one passenger. During flight, they noticed an electrical odour, then a small fire and smoke emanating from the bottom of the lower left instrument panel. They were able to extinguish the fire, but the use of the extinguisher clouded the cockpit, reducing visibility considerably. Fortunately, after opening the side windows, they were able to regain enough visibility and landed uneventfully. (Reference TSB #A07O0264)

The Transportation Safety Board of Canada (TSB) report concluded with two safety advisories, one advocating for action to mitigate or eliminate the threat of fire caused by switches in the landing light circuit of Cessna 152 aircraft. The Federal Aviation Administration (FAA) responded with Special Airworthiness Information Bulletin (SAIB) CE-09-42-1 directed at Cessna 100, 200 and 300 series aeroplanes. This SAIB recommends that owners, operators, and maintenance technicians perform the actions contained in Cessna Service Bulletins SEB09-6, and MEB09-3. This topic was also published in detail in the Aviation Safety Letter Issue 4/2010.

Since the publication of these recommended maintenance actions by the FAA and Cessna in 2009, additional Service Difficulty Reports (SDRs) have been submitted, reporting further failures in Cessna 152 and 172 aircraft. These failures include but are not limited to Part Number C906-5, many of which failed prior to reaching their recommended service life. These failures have been described as: melted, heat damaged, overheated, smoke coming out of panel, stuck or welded in the on or off position, discoloured, and stiff to operate. Transport Canada Civil Aviation recommends that owners, operators, and maintainers become familiar with the contents of FAA SAIB CE-09-42-1, pay particular attention to all landing light, beacon light, and taxi light

switches for signs of failure, and continue to submit SDRs when defects such as these are uncovered.

Beech – B300

Lower Forward Wing Attachment Bolt Corrosion

SDR #: 20220808014

Subject:

During an inspection of a lower forward wing attach bolt carried out every 60 months in accordance with Beechcraft Special Inspection 57-18-03, the bolt was found to be seized and unable to be removed in accordance with Beechcraft instructions. When communicating with Beech, we were informed that this is unusual and the bolt should not be seized.

Transport Canada Comments:

A Textron technician assisted the operator in the removal and replacement of the lower forward wing attachment bolt which was seized due to corrosion. The technician mentioned that a possible cause of corrosion may be due to the use of anti-ice solution used in northern climates.

Corrosion discovered in the case of this Service Difficulty Report (SDR) has not been determined to be the result of a lack of corrosion preventative compound (CPC), although Transport Canada Civil Aviation (TCCA) would like to remind maintainers of the importance to follow recommended practices outlined in the appropriate instructions for continued airworthiness (ICA). Current mandatory replacement of the lower forward wing attachment bolts every five (5) years and annual servicing recommendations both require the correct application of specified CPC. TCCA would appreciate receiving any additional SDRs of wing attachment bolt corrosion, particularly where recommended servicing has been followed.

Since the drafting of this Feedback Article, Textron Aviation published Multi-Engine Turboprop Communiqué MP-TP-0033 (January 2023) discussing this subject in detail. Additionally,

MP-TP-0033 includes recommended removal techniques to complement existing ICA maintenance practices.

Figure 1 – Forward lower wing attachment bolt – Corrosion evident

Figure 2 – Forward lower wing attachment fitting

Fairchild, SA227AC

Air Conditioning Cooling Turbine Failure

SDR #: 20201007004

Subject:

On short final, a burning smell was noticed. After landing, on the short taxi to the ramp, smoke was noticed in the cockpit. On arrival at the ramp, the smoke had increased, the engines were shut down and the aircraft flight crew vacated more expeditiously than normal (this is a freight aircraft, no passengers were on board, two (2) crew only). The smoke cleared and no evidence of a fire was found anywhere in the aircraft. Maintenance investigation found that the left-hand (L/H) conditioned air-cooling turbine had failed and that the turbine bearing had overheated and failed, which caused the oil reserve in the turbine to smoke and enter the cabin air vent system. The turbine is an

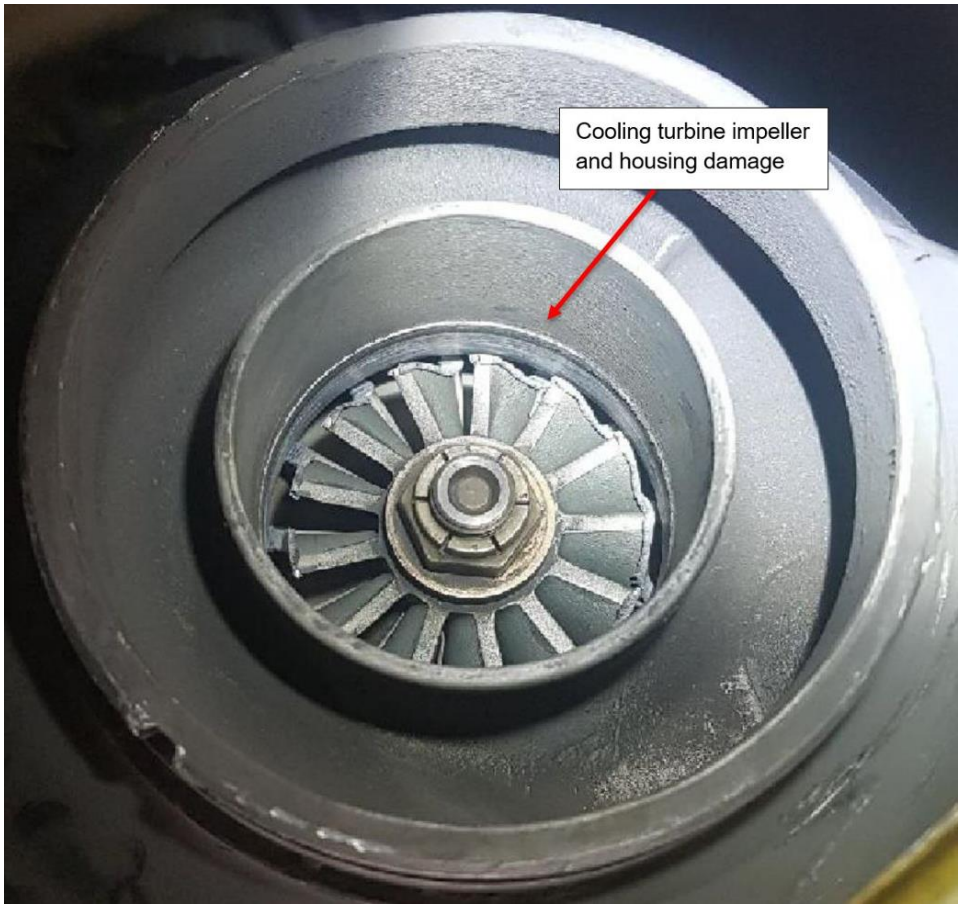
on-condition item that is subject to a 200-hour oil level check during which a visual inspection is also carried out. This inspection was carried out 172 hours prior to the failure, with no abnormalities found.

Transport Canada Comments:

Cooling turbine bearing failure often results in seizure, and multiple service difficulty reports (SDRs) suggest that this is accompanied by smoke/oil mist in the cabin. Other indications of failure have been described as: smoky haze, white smoke, or acrid smell in the cabin/cockpit. Cabin temperature rising, while not responding to temperature controller or manual temperature control, has also been reported.

It is important to reiterate that inspection and servicing outlined by the manufacturer should be completed correctly and during the suggested interval. In addition, SDR data suggests that high oil level, or a blockage in the air delivery system may contribute to cooling turbine failure.

Australian Transport Safety Bureau (ATSB) covered a similar occurrence: AB-2018-033. The following picture from this report illustrates the result of a typical cooling turbine bearing failure.



Picture 1 – Cooling turbine bearing failure

Pilatus, PC12 45

PC 12 Main Landing Gear (MLG) Fracture and Collapse

SDR #: 20220922013

Subject:

The MLG lower trailing link broke away from the upper yoke fitting. The pivot pin attach lug on the yoke fitting, inboard side, broke in half, allowing the lower trailing link bushing and pin to separate from the upper gear leg.

Transport Canada Comments:

This Feedback Article aims to raise awareness in the PC 12 community of potential undetected corrosion being present under specific bushings of the yoke fitting assembly. It is suspected that this corrosion weakens the bore in the yoke fitting which can cause the separation of the lug from the rest of the yoke assembly. This specific aircraft was positioning for takeoff at the end of the runway when the lower trailing link broke away. The gear assembly is presently with Pilatus in a Swiss lab for investigation.

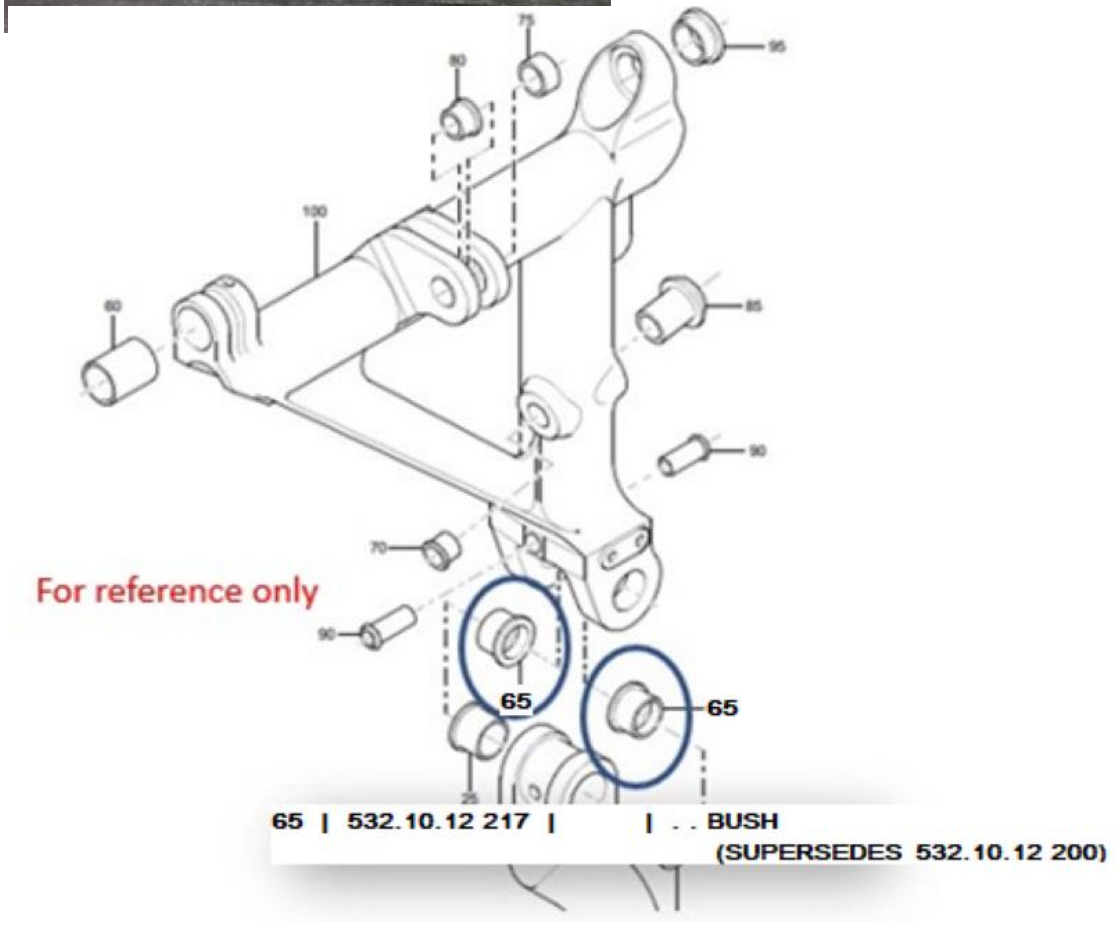
Pilatus specifies in their MLG Component Maintenance Manual (CMM) that up to “25,000 flying hours or 30,000 landings (whichever comes first), the overhaul of the MLG is done 'on condition' and requires the disassembly, cleaning, check, repair (if necessary) and assembly of the component”. The overhaul consists of an examination and dimensional check of the bushings, but removal is optional.

Transport Canada Civil Aviation recommends that operators pay extra attention to these bushings during all routine maintenance checks for signs of corrosion. The Pilatus MLG CMM provides specific instructions for the subject bushings' removal, inspection, repair and reinstallation.

Picture 1 – Fractured gear impacting the runway

Picture 2 – Close-up of the lug with corrosion present in the bore

Picture 3 – CMM reference



Beech, A100

Aging Aircraft – Electrical Cables and Connections

SDR #: 20230210018

Subject:

During a training flight, the crew selected the landing gear handle to the up position. The landing gear did not retract. Upon checking the circuit breakers, it was found that the right-hand no1 and no2 subpanel feeder 50-amp circuit breakers were out, which caused loss of power to the no2 dual fed subpanel bus. During an inspection, it was found that the zero-gauge wires, connected to the terminal studs of the isolation limiters on the isolation limiter bus, were loose and had arced. The system was repaired and the aircraft returned to service with no subsequent issues.

Transport Canada Comments:

Aging aircraft, particularly their electrical cables and connections, are a significant concern in the aviation industry. The electrical system of an aircraft is complex, and it is critical to the safe operation of the aircraft. Over time, the cables and connections in the electrical system can deteriorate due to factors such as environmental exposure, vibration, and mechanical stress. As a result, it is essential to inspect the electrical cables and connections regularly to ensure that they are in good condition and functioning correctly.

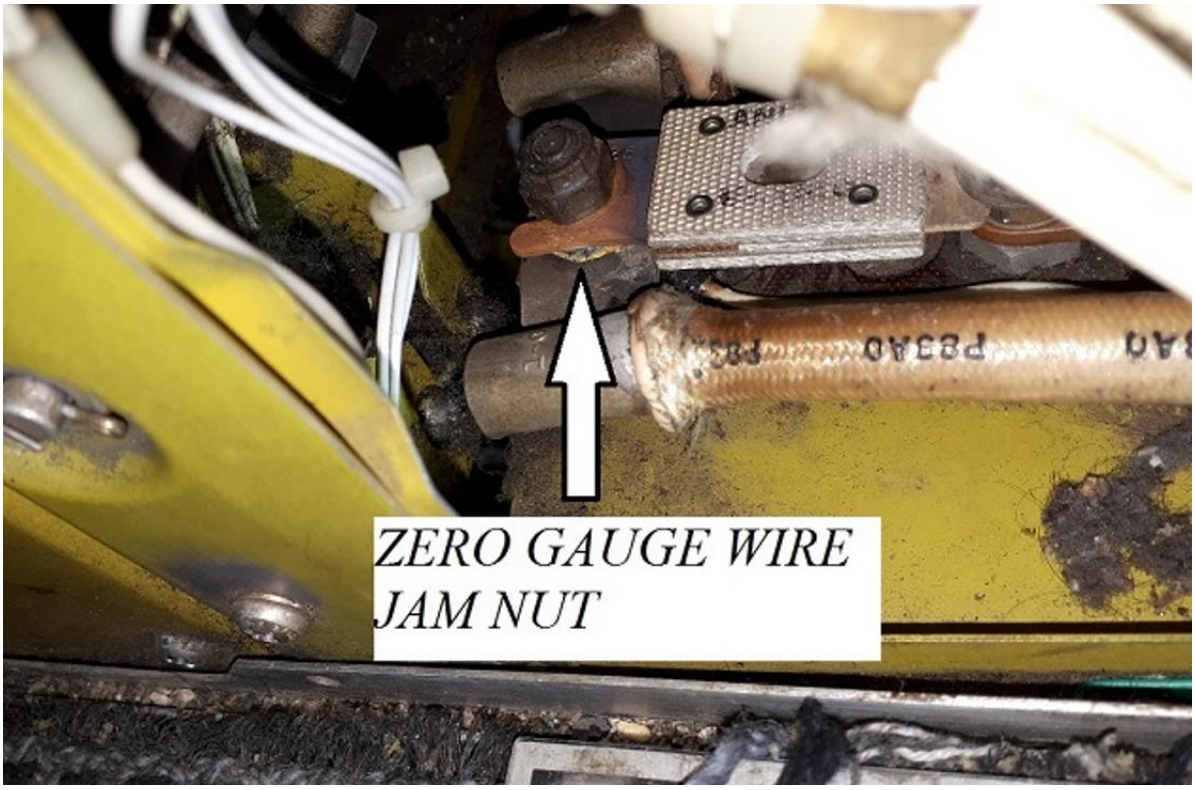


Figure 1 – Isolation limiter terminal stud location

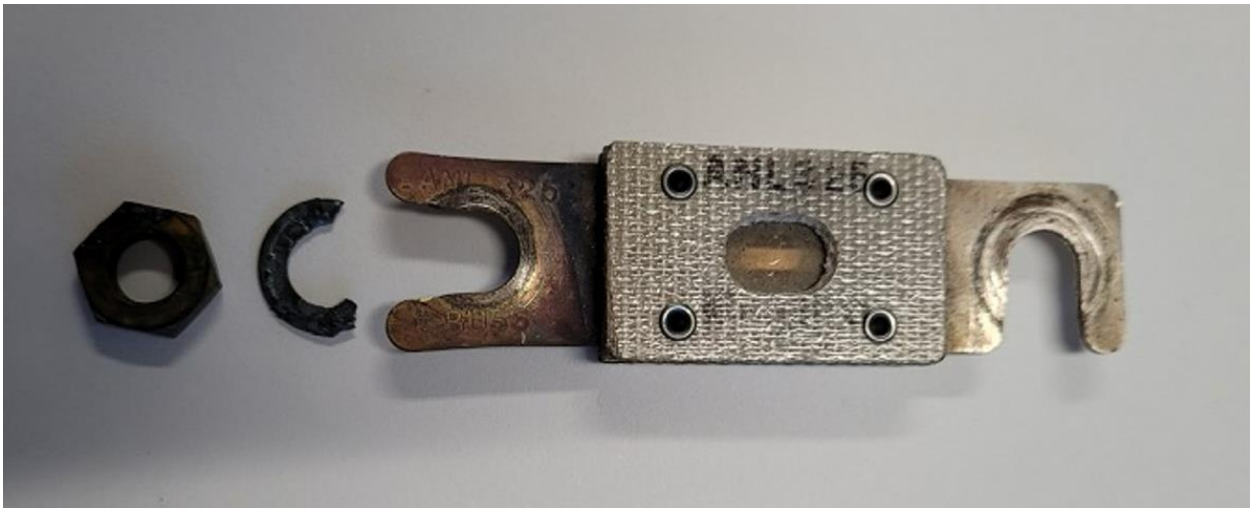


Figure 2 – Unserviceable hardware evident

Bombardier, BD 700 1A11

Global 5000 Unintended Life Raft Deployment

SDR #: 20190912008

Subject:

During cabin inspection the pilot observed that the life raft that is stored under the aft cabin divan appeared to be swollen and he was unable to move or remove the raft. The mooring line and ripcord are both on the inside of the compartment and were inaccessible. The ripcord/mooring line were not pulled. Something had failed and caused it to inflate. A procedure was supplied by Winslow where after trying to remove the raft by following the first steps in the procedure it was unsuccessful. The procedure for drilling the raft in the location was followed and it was found that the raft was inflated; the pressure was released and the raft was successfully removed from the aircraft. It was found to have self-inflated with both the inflation pull handle and mooring line still intact and not pulled.

Transport Canada Comments:

It is important to inspect all safety equipment before flight to ensure that they are in proper working order. In this case, the life raft would have been unusable in an emergency situation.

Figure 1 – Image of the inflated life raft

Embraer, EMB 545

Leaky Brake Control Valve

SDR #: 20230410034

Subject:

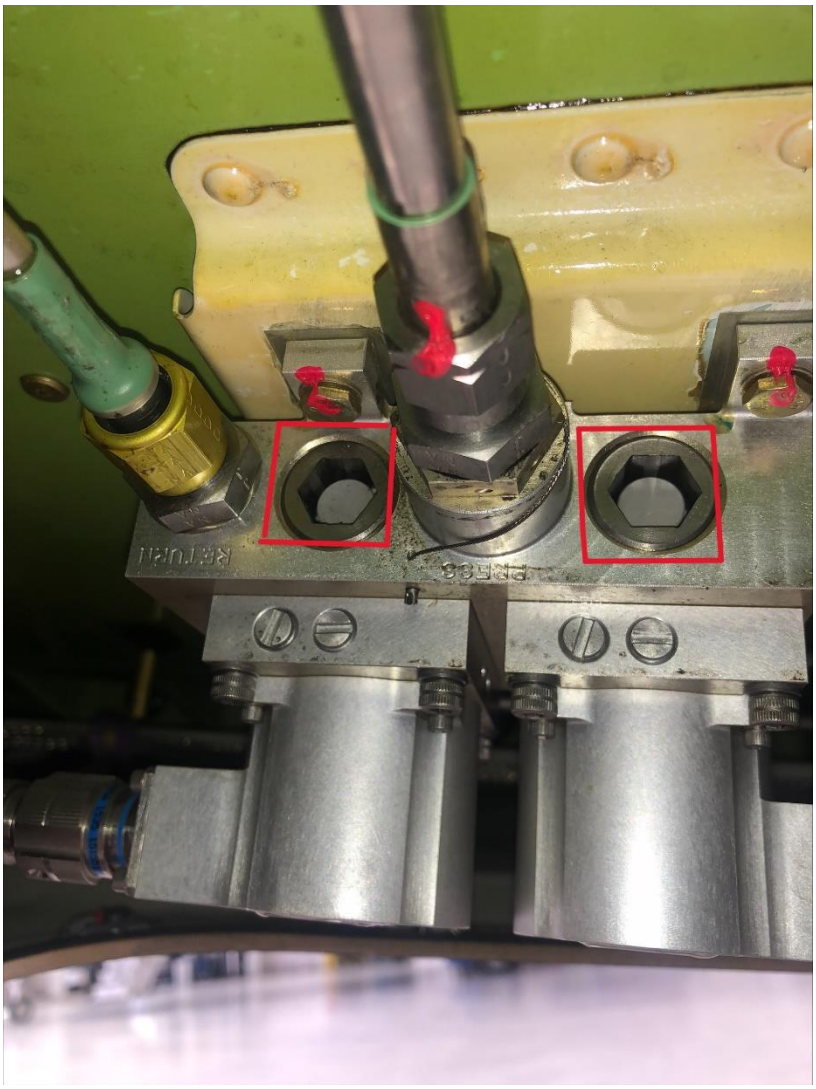
The crew contacted maintenance for a (blue advisory) hydraulic #1 low quantity crew alerting system (CAS) in flight. The decision was made to divert the aircraft and land. No caution CAS message appeared during the event. Hydraulic system #1 quantity started at about 51% and dropped to 16% after touchdown. The attached picture shows the brake control valve, part number 90007135-2, with an Allen key bolt backed out and leaking hydraulic fluid. A picture of the correctly installed Allen key bolts on a serviceable brake control valve is attached for reference.

Transport Canada Comments:

This interesting event shows how a component can fail for many reasons. Control valves will typically fail mechanically or electrically. The backing out of a set screw shows a possible assembly error at overhaul or manufacture.

Maintainers and operators are asked to watch for even the less apparent faults.

Picture 1 – Leaking Brake Control Valve



Picture 2 – New Brake Control Valve with flush set screws

Engines

Pratt & Whitney Canada PT6A-21

Propeller Governor Flyweight Bearings Insufficient Ball Retention

SDR #: 20230202005

Subject:

During a normal inspection, it was discovered that the right-hand engine magnetic chip detector had a piece of metal attached to one of its magnetic pick-ups. It was a metal ball of 0.039 inch in diameter. We sent the information to the engine manufacturer and after several days, the information came back stating that the ball was probably coming from the propeller governor and possibly also from the overspeed governor. The

propeller governor was removed and sent to the overhaul facility who confirmed that one of the four internal flyweight bearings failed. All eight (8) balls and race were missing. On our side, no other metal part has been found so far into the oil filter, on the aft Accessory Gear Box (AGB) pump inlet screen or around the forward AGB magnetic chip opening.

Transport Canada Comments:

Woodward, the propeller governor manufacturer, issued Service Bulletin (SB) 83053-61-027 in 2012. The SB provides instructions for replacing bearings that were assembled with lightly crimped bearing retainers. Engineering analysis, conducted cooperatively by the engine, governor and bearing manufacturers, concluded that the failure was likely caused by a vigorous oscillatory motion of the two-piece, loosely crimped, bearing retainer resulting in fretting wear of the retainer assembly.

Further to their investigation into this Service Difficulty Report (SDR), Pratt & Whitney Canada continues to promote compliance with Woodward SB 83053-61-027. Transport Canada Civil Aviation (TCCA) concurs with this position and would like to highlight the value in assessing and following manufacturers' recommendations, including those at the component or vendor level.

TCCA encourages submission of SDRs for similar events through the Web Service Difficulty Reporting System.

Figure 1 – Damaged flyweight bearing

Figure 2 – Damaged and serviceable flyweight bearings

Pratt & Whitney - CAN, PT6A-27

Corroded Starter Generator Drive Gear Shaft

SDR #: 20220623027

Subject:

Starter generator drive gear shaft assembly, Part Number 3029567, was received in overhauled condition. During the receiving inspection, it was noted that corrosion was present on the gear shaft once the protective cap was removed.

Transport Canada Comments:

Overhauled components regularly sit on storage shelves for extended periods and may not get inspected before being shipped.

The bearing surface of the gear shaft had numerous pit marks from corrosion, which may have been caused by improper preservation for storage. This corrosion was not detected until the protective cap was removed from the gear shaft assembly.

Transport Canada Civil Aviation reminds maintainers and operators to carry out receiving inspections to ensure serviceability of incoming components. Do not assume parts are serviceable because of the documentation attached. Well done to this operator who caught this issue prior to the gear shaft being installed in an accessory gearbox.

Picture 1 – Corroded gear shaft

Pratt & Whitney - CAN, PW210A

Fuel Control Unit (FCU) Casting Defects

SDR #: 20230119005

Subject:

The FCU supplier recently discovered various casting defects within several internal core passages of the inlet housing assembly of the FCU. These defects are mainly excess aluminum material of various shapes (granules, globules, raised ridges, casting flash) resulting from the casting process. The estimated size of these defects ranges from 0.030 to 0.180 inches. There can also be a thin wall thickness condition potentially leading to a fuel leak or affecting the FCU's functionality. A total of 52 FCUs are affected by this condition. A service bulletin (SB) will be issued to replace the FCU within 150 hours. For helicopters that have two engines affected by this condition, the recommendation is to replace one of the two FCUs before further flight. The affected engine models are PW210A, PW210A1, and PW210S.

Transport Canada Comments:

Transport Canada Civil Aviation (TCCA) would like to raise awareness of this finding to operators and maintainers of the affected engine models. A manufacturing issue may result in a possible blockage of the FCU internal passage affecting fuel flow and may also result in a thin wall thickness condition that could lead to external fuel leakage.

The engine manufacturer, Pratt & Whitney Canada (P&WC), issued SB A57168 which addresses this issue. Please review the SB and component logs or check part numbers and serial numbers of the FCUs on the affected engine models and contact P&WC for disposition.

As TCCA continues to monitor this issue, please report any findings directly to P&WC or to TCCA via the Web Service Difficulty Reporting System.

Pratt & Whitney - CAN, PW123

Fuel Line Fitting Under-Torqued

SDR #: 20211129009

Subject:

On take-off while climbing through 1500 feet, the crew identified a loss of torque on the #2 engine accompanied by a loss in propeller Revolutions Per Minute (RPM). The torque went to zero and the crew secured the engine. The aircraft landing was uneventful. An inspection by maintenance determined the loss of power was caused by a fuel leak at the fuel flow divider fuel inlet tube assembly. The affected fuel line and fittings were inspected, O-rings were replaced on the flow divider transfer tube and the line installed in accordance with the maintenance manual. Engine power runs were completed, and the aircraft was released back to service.

Transport Canada Comments:

The occurrence summary in the Transportation Safety Board (TSB) daily notification log of this event states that the maintenance personnel determined that an under-torqued fuel line fitting led to the drop in fuel pressure and subsequent engine power loss.

The fuel, oil and electrical systems of engines are normally housed in very cramped and restricted areas of most aircraft and access can be limited at best. Many “B” nuts for fluid lines may not have clearance to attach a torque wrench in a conventional way and a variety of extensions or adapters may have to be used for access. These extensions or adapters may result in an over or under torque situation. The proper torquing of these lines is vital to ensure they remain secure so maintainers are reminded to be vigilant when installing or inspecting these lines and consult manufacturer’s instructions or standard practices such as AC43.13-1B for proper torque calculations if using extensions or adapters.

This aircraft had an uneventful landing however had the fuel leak ignited, it may have been a very different outcome.

Williams, FJ44-3A

Power Turbine Temperature Sensor and Electrical Connector

SDR #: 20220810003

Subject:

On ground, an engine turbine temperature heater fail annunciator and an engine control system annunciator were received. After shut down, the circuit breaker for the left hand power turbine temperature heater was found open in the tail cone. Upon inspection, it was noted that the P20 electrical connector had uncoupled from the engine power turbine temp sensor and was hanging loosely within the intake structure. The P20 electrical connector`s threaded bezel had fractured into several pieces. Evidence of electrical arching was noted on the J20 and P20 electrical connectors. The body of the failed sensor appeared to be swollen when compared to a serviceable unit. Additionally, it was observed that one of the sensor's three mounting bolts had pulled through the isolation grommet. Research of the technical records show no maintenance had been performed on the sensor.

Transport Canada Comments:

Transport Canada is bringing attention of this event to operators and maintainers of the Williams FJ44-3A and similar models.

The photos attached show the extent of several failed components of the power turbine temperature sensor system. The electrical connector plug P20 may have disconnected because of the damaged threaded bezel fracturing therefore not being secured to the receptacle J20, however why it fractured could be the result of the sensor itself which appears to have overheated and distorted its shape. This distortion may also have caused the mounting bolt and grommet to pull out of the mounting bracket.

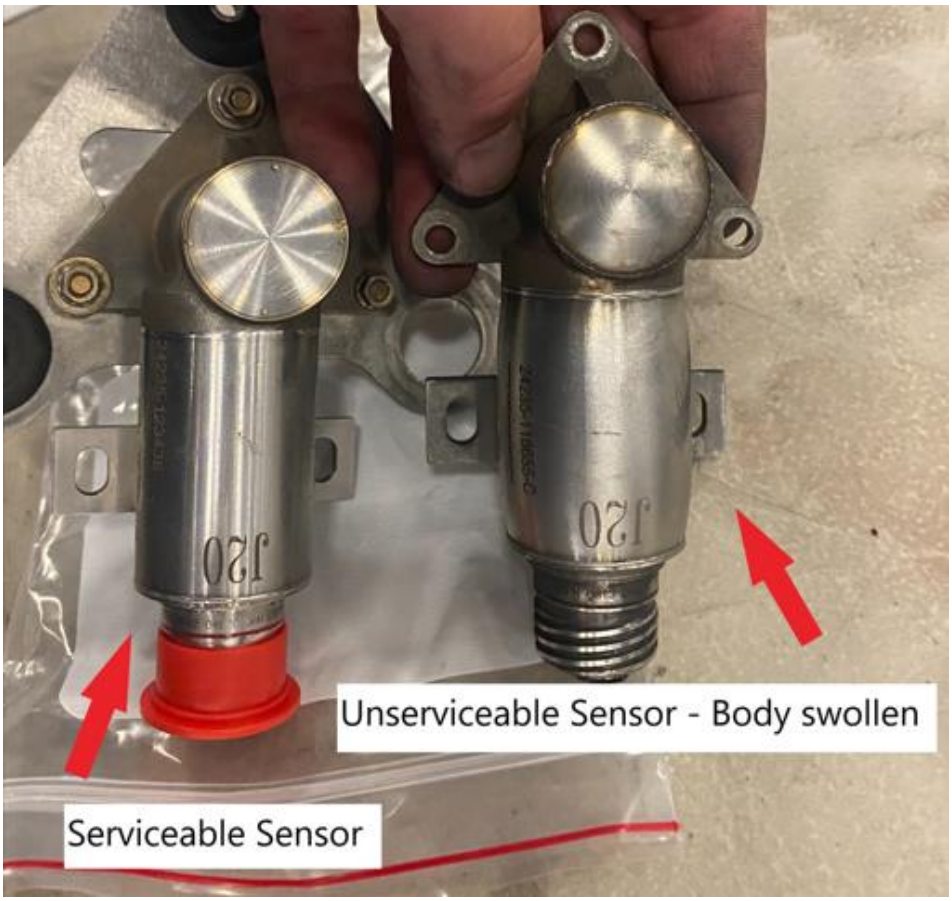
TC would like to remind operators and maintainers to pay particular attention to this sensor and connector when inspecting in this area and note of any findings by reporting them through their SDR reporting system.

Picture 1 - Disconnected P20 electrical connector

Picture 2 - Damaged J20 electrical connector

Picture 3 - Damaged P20 electrical connector

Picture 4 - Missing mounting grommet



Picture 5 - Serviceable and Unserviceable Sensor

Rotorcraft

Bell Textron - CAN, 505

Fuel Drain Tube Chafing

SDR #: 20220706006

Subject:

It was reported to Bell that a fuel drain tube was chafing against a compressor wash line tube.

Transport Canada Comments:

Bell has investigated reports of chafing between a fuel drain tube and the engine compressor wash tube, and consequently, issued Alert Service Bulletin (ASB) 505-22-29. The ASB provides instructions to accomplish a one-time inspection of the affected tubes for chafing. In addition to the inspection, the ASB also introduces clamping to ensure proper clearance between the tubes is maintained. Transport Canada Civil Aviation (TCCA) encourages the owners, operators, and maintainers of Bell model 505 helicopters to review and accomplish Bell ASB 505-22-29.

Suspected Unapproved Parts (SUP)
In Canada, SUPs are reported in accordance with section 571.13 of the standard of the Canadian Aviation Regulation (CAR).

When you suspect an unapproved part, the SUP report can be submitted on the SDR form or through the Web Service Difficulty Reporting System

To view the most recently published Suspected Unapproved Parts, click here or go to this website https://tc.canada.ca/en/aviation/aircraft-airworthiness/continuing-airworthiness/feedback-canadian-aviation-service-difficulty-reports/suspected-unapproved-parts-sups

FAA Unapproved Parts Notifications (UPN)
Unapproved Parts Notifications are published by: FAA, AIR-140, P.O. Box 26460, Oklahoma City, OK 73125. They are posted on the Internet at: https://www.faa.gov/aircraft/safety/programs/sups/upn/

To view the most recently published FAA Unapproved Parts Notifications (UPN), click here or go to this website http://www.tc.gc.ca/eng/civilaviation/certification/faa-unapproved-parts-notifications.html

FAA Special Airworthiness Information Bulletins (SAIB)
A Federal Aviation Administration (FAA) SAIB is an information tool that alerts, educates, and makes recommendations to the general aviation community. It is non-regulatory information and guidance that does not meet the criteria for an Airworthiness Directive (AD). They are posted on the Internet at: https://www.faa.gov/aircraft/safety/alerts/SAIB/

To view the most recently published FAA Special Airworthiness Information Bulletins (SAIB), click here or go to this website http://www.tc.gc.ca/eng/civilaviation/certification/faa-special-airworthiness-information-bulletins.html

EASA Safety Information Bulletins (SIB)
A European Aviation Safety Agency (EASA) SIB is an information tool that alerts, educates, and makes recommendations to the general aviation community. It is non-regulatory information and guidance that does not meet the criteria for an Airworthiness Directive (AD). They are posted on the Internet at: https://ad.easa.europa.eu/sib-docs/page-1

To view the most recently published EASA Safety Information Bulletins (SIB), click here or go to this website http://www.tc.gc.ca/eng/civilaviation/certification/easa-safety-information-bulletin.html

Equipment Airworthiness Directives (AD)
Transport Canada (TC) endeavors to send copies of new Airworthiness Directives (ADs), which are applicable in Canada to the registered owners of the affected products. Equipment/appliance ADs are often only distributed to our regional offices because the owners of aircraft affected by this type of AD are not generally known.

Aircraft Maintenance Engineers (AMEs) and operators of the affected products are encouraged to obtain further information or a copy of the ADs from their regional TC office, their local Transport Canada Centre (TCC), their Principal Maintenance Inspector (PMI), or from the Civil Aviation AD website.

To view the most recently published Equipment Airworthiness Directives (AD), click here or go to this website http://www.tc.gc.ca/eng/civilaviation/certification/equipment-airworthiness-directives.html

Service Difficulty Reports (SDRs)
Service Difficulty Reports are submitted by Aircraft Maintenance Engineers (AMEs), owners, operators and other sources to report problems, defects or occurrences that affect aircraft airworthiness in Canada.

To view the most recently published Service Difficulty Reports (SDRs), click here or go to this website http://www.tc.gc.ca/eng/civilaviation/certification/service-difficulty-reports.html