Feedback

Canadian Aviation Service Difficulty Reports

The following content was published between January 1, 2020 and April 1, 2020

Table of Contents

Heads Up

Incorrect Hook and Loop Installation on Emergency Locator Transmitters (ELT)

SDR #: 20181203023

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

It was noticed during an annual inspection that the Velcro strap (included with the S1840502-01 mount) was found with the metal buckle directly overtop the top face of the ELT. As per the Kannad Aviation installation/operation manual, the metal buckle must be positioned on the left or right of the ELT only. The position is listed as a caution that incorrect installation of the Velcro strap could lead to an unsafe condition. Upon removal of the strap, it was found that the factory-installed Velcro strap had its small Velcro tab (which attaches to the backside of the mount to orient the Velcro strap) incorrectly attached to the strap approximately 5.5" from the buckle (normal is approx. 3.5"). This allows for the Velcro strap to be installed incorrectly without the installer knowing it is incorrect (unless they are aware of the proper procedure and figure within Kannad's manual). The Velcro strap itself does not have a part number, it is only listed as "included with the bracket mount." It is unknown if this Velcro tab is meant to be glued, sewn, or otherwise attached to the Velcro strap. It is also unknown if it is required for the Velcro strap to be considered in a serviceable condition.

Transport Canada Comments:

This Service Difficultly Report (SDR) is an excellent example of observing an incorrect installation that could have led to a possible malfunction of the ELT in an emergency situation. The Federal Aviation Administration (FAA) published Special Airworthiness Information Bulletin (SAIB) HQ-12-32 to inform ELT manufacturers, installers and aircraft maintenance personnel of a concern of hook and loop-style fasteners' ability to restrain ELTs during accident impact. Subsequently, Kannad Aviation published service bulletin (SB) S1800000-25-00 to outline the instructions for properly securing the ELT during installation and reinstallation. In addition to the SB, Kannad Aviation has also published service letter (SL) SL S18XX502-25-12 to provide instruction for completing the Canadian Aviation Regulations (CARs) Part V & VI ELT periodic testing and inspection requirements. The SL also directs the reader to multiple bolded caution messages related to the incorrect installation of the hook and loop fasteners. Seemingly simple work should not be overlooked; it is important at all times to read each manufacturer's installation instructions and instructions for continued airworthiness to correctly complete the job.

Image 1 – Example of an incorrect installation of the hook and loop fastener with metal buckle on the face of the Kannad 406 AF ELT.

Image 2 – Example of the correct installation of the hook and loop fastener where the metal buckle on the side of the Kannad 406 AF ELT.

Bombardier, BD 500 1A10

Nose Landing Gear (NLG) Collapsed Oleo Events

SDR #: 20180208005

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

The Nose Landing Gear (NLG) oleo strut collapsed in-service. After touchdown, a very strong shimmy and vibration from the nose gear was observed. The same shimmy and vibration was observed at the (2) previous landings. During the arrival inspection, the NLG was found deflated and fully collapsed. Further inspection found the groove nut touching the sliding tube and the gland nut locking washer displaced and bent.

Recommendations for repair from Liebherr were requested by the operator and the Flight Data Recorder (FDR) data was downloaded for readout and troubleshooting. Bombardier and Liebherr recommended inspections were carried out before returning the aircraft to service.

Transport Canada Comments:

A number of in-service events occurred in early 2018 on very low time NLG assemblies where the oleo lost fluid and nitrogen. These events occurred on NLG oleos with times in-service between 603 to 3346 flight cycles and 1373 to 3592 hours air time. In two (2) of the cases, the oleo gland nut lock ring was damaged and was actually pulled out of place. The landing gear manufacturer attributes the lock ring damage as a result of turning the aircraft with the oleo fully deflated. One air turn back also occurred because the NLG would not retract and when investigated, it was discovered that the oleo had lost fluid and was not at proper extension.

In some of the cases it is believed that the aircraft may have been dispatched with a flat oleo, as evidenced by the investigations and reported crew observations while operating the aircraft on preceding flights. The oleo outer cylinder lower portion is chrome and not painted which is unlike most other aircraft landing gear. It may be possible to assume that the oleo is inflated and has some extension when in fact the oleo is flat and has no extension because of this chromed area. Refer to the attached pictures figures 1 through 3 showing a deflated /collapsed oleo.

In February 2018, Bombardier issued Service Letter (CS-SL-32-20-0001) to inform operators to perform a pre-flight inspection for proper oleo extension. In November 2018, to address the loss of fluid and nitrogen, Liebherr issued Vendor Service Bulletin (VSB) 4124A-32-04 to upgrade the lower cam, dynamic seals and the scraper seal of the NLG shock strut assembly. These changes are intended to reduce the possibility of a NLG shock strut sudden leakage in-service. At the time the VSB was issued it applied

to 71 affected aircraft of which 14 had been modified. All aircraft delivered, after the VSB was issued, have this upgrade before delivery. The incorporation of this VSB modification on shock strut assembly Part Number (P/N) 4124A1000-04 changes the shock strut assembly to P/N 4124A1000-05 so it is easy for operators to confirm the VSB has been incorporated.

The last event occurred in January 2019 and according to the Service Difficulty Report (SDR) information, the oleo was reported as P/N 4124A10000-4 which is the P/N of a pre-VSB oleo. This VSB incorporation is strongly recommended so operators should confirm that they have P/N 4124A10000-5 oleos.

Figure 1: Fully collapsed oleo with locking ring damaged

Figure 2: Close-up of gland nut lock ring pulled out and collapsed oleo

Figure 3: Another aircraft with similar fully collapsed oleo and bent and damaged gland nut lock ring. Note silver colour of outer cylinder

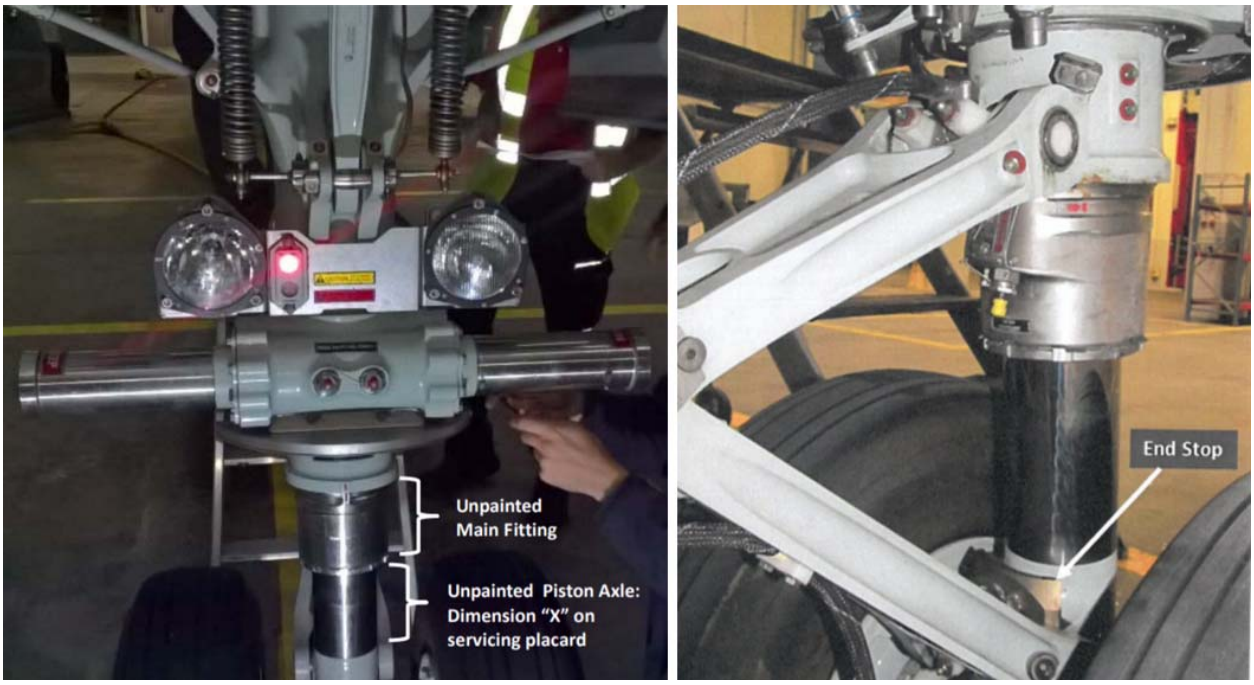


Figure 4: Oleo shown with proper extension in serviceable state

Penney & Giles, Multi-Purpose Flight Recorder

Penney & Giles Aerospace Ltd Multi-Purpose Flight Recorder (MPFR) Internal Corrosion

SDR #: N/A

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

Data recovery on certain Penney & Giles Aerospace Ltd Multi-Purpose Flight Recorders (MPFRs) have been found to be problematic where the aircraft was submerged in water. Corrosion on pins of memory devices, due to an insufficient amount of conformal coating, may occur when subjected to water.

Certain "GEN2" memory modules manufactured between 6 April 2006 and 2 January 2013 may be susceptible.

Transport Canada Comments:

The European Aviation Safety Agency (EASA) has issued Safety Information Bulletin (SIB) 2018-05 highlighting this issue, and recommends owners and operators accomplish the actions specified in Penny & Giles Aerospace Ltd Service Bulletin (SB) No. D51615-31-22. Penney & Giles Aerospace Ltd will work with the operator to schedule an upgrade of the "GEN2" memory module in the affected serial number range.

Although this is not considered to be an unsafe condition that would warrant an Airworthiness Directive (AD), Transport Canada would like to highlight, that it is the owner's responsibility to verify applicability of miscellaneous equipment ADs. In addition, as best practice, operators should be checking SIBs and Special Airworthiness Information Bulletins (SAIBs) etc. of foreign authorities.

Fixed Wing

Aerospatiale, ATR 42 300

Burnt Wiring on Fuel Probe

SDR #: 20190403004

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

Right-hand fuel gauge unreliable, over reads sometimes and under reads sometimes. Maintenance investigation: fuel probe wiring harness checked, static dischargers checked and rear spar bonding checked in accordance with the ATR Aircraft Maintenance Manual. No faults found. All probes inspected in accordance with the component Maintenance Manual and found two fuel quantity probes with what appears to be burnt wiring inside the probes.

Transport Canada Comments:

Any arcing in the wiring in the aircraft fuel tank can be catastrophic. When inspecting fuel quantity probes, pay close attention to the condition of the wires in the probes.

Burnt wire in the fuel quantity probe

Airbus, A319 114

Improper Wire Routing Leads to Shocking Snag

SDR #: 20170811002

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

While troubleshooting a snag about seats 1F and 1D, the power outlet was found to be unserviceable. The technician found the power outlet was missing one of the three AC phases. After consulting the wiring schematic, the wiring was traced and the fault was discovered in panel 2000VU. Wire w9019-909-16 was cut and wire 4641-ac9251-yy16 was found chafed. The second wire was found to be the 115vAC power for the onboard GOGO WIFI. Upon further inspection, it was found that the routing of the harness was wrong and it was rubbing against a bolt holding a clamp inside panel 2000VU.

Transport Canada Comments:

Installers and maintainers are reminded to confirm there is no contact between items or components. While this instance simply resulted in an inconvenience for a few passengers, chafing of wiring can result in a much more serious event.

The results of chafed wiring. Arcing evident.

Arcing evident on bolt for DG clamp.

Small panel with tight clearance compounded with many wires.

Beech, A100

Rudder Pedal Failure

SDR #: 20130325018

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

Pilot reported that the aircraft was hard to steer. Maintenance found the pilot's right-hand rudder pedal arm had broken off where the pedal is attached to the arm.

Transport Canada Comments:

This rudder pedal design is common across multiple Beechcraft models. Part Numbers (P/N) 50-524326 (all dash numbers) and P/N 002-524020 (all dash numbers). Beechcraft does include detailed inspection criteria and possible bushing insert repair instructions. Multiple Service Difficulty Reports (SDRs) continue to be submitted regarding excessive wear or failure of the rudder pedal.

Transport Canada Civil Aviation (TCCA) recommends particular attention be given during scheduled inspection. Wear may be difficult to estimate or cracks may go unnoticed while the pedals are still attached.

Related Feedback Article 1/2014 (SDR) # 20120510005

Failure of the rudder pedal arm at the brake pedal pivot holes.

Beech, B100

Smoke in the cabin

SDR #: 20190516012

Subject:

The translated article below is taken from a Service Difficulty Report's (SDR) problem description submitted in French.

During the initial climb, the pilot felt it was unusually hot even though the heating system was set correctly. Shortly after, smoke began flowing from the exhaust tubes. The pilot declared an emergency and returned to the airport of departure where it landed safely. The maintenance team investigated and found a melted heating duct. The aircraft is still on the ground so that the cause of the overheating can be investigated. The King Air B100 has no system to indicate overheating of its heating system. An inspector from the Transportation Safety Board (TSB) came to report on the situation. Two heating ducts (part number (P/N) 97-555011-15) were replaced, the right-hand bypass valve was found to be non-functional, which caused the overheating. The bypass valve actuator (P/N NYLC9871) was replaced, the system was ground-checked and operates normally. The aeroplane was returned to service, and it flew. The system is functioning normally.

Transport Canada Comments:

Similarities exist between this event and a B100 Emergency Landing in 2012. Both aircraft experienced smoke in the cabin due to melting of a section of hot air duct below the floor. See TSB Aviation Investigation Report A12Q0029.

Beech King Air 90 and 100 series aircraft do not utilize a duct overheat annunciator. Repeated overheating of the system, environmental exposure to heat (proximity to bleed lines), or other unreported anomalies relating to the bleed air and heating system, can all exacerbate the problem. A faulty bypass valve in this case could introduce air hot enough to cause damage to air ducts.

Maintenance personnel are reminded to pay particular attention to the hot air ducts and under-floor bleed air lines. The ducts are covered with insulation, and it could be difficult to detect any thermal deterioration or deformation. Beech recommends to physically inspect ducts by touching ducts, checking for thermal deterioration, deformation of the ducts, and proper connection at the joints.

Caution: Bleed air lines as well as hot air ducts may run in proximity to pneumatic de-icer boot pressure tubes (Ethyl vinyl Acetate (EVA) tubing) and electrical wiring. Minimum distances as identified in the Maintenance Manual must not be overlooked.

Deformed ducts or EVA tubing should always warrant further investigation to uncover the cause.

Melted cabin heater duct

Beech, B300

Beech B300 – Aileron Balance Weight Cracked and Separated

SDR #: 20181023015

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

During unscheduled maintenance, abnormal noise was heard coming from the right-hand aileron. Removed aileron and found aileron balance weight broken into 2 pieces. Outboard 13 inches of balance weight was found to be held on with 1 CherryMAX rivet which it was rotating on.

Transport Canada Comments:

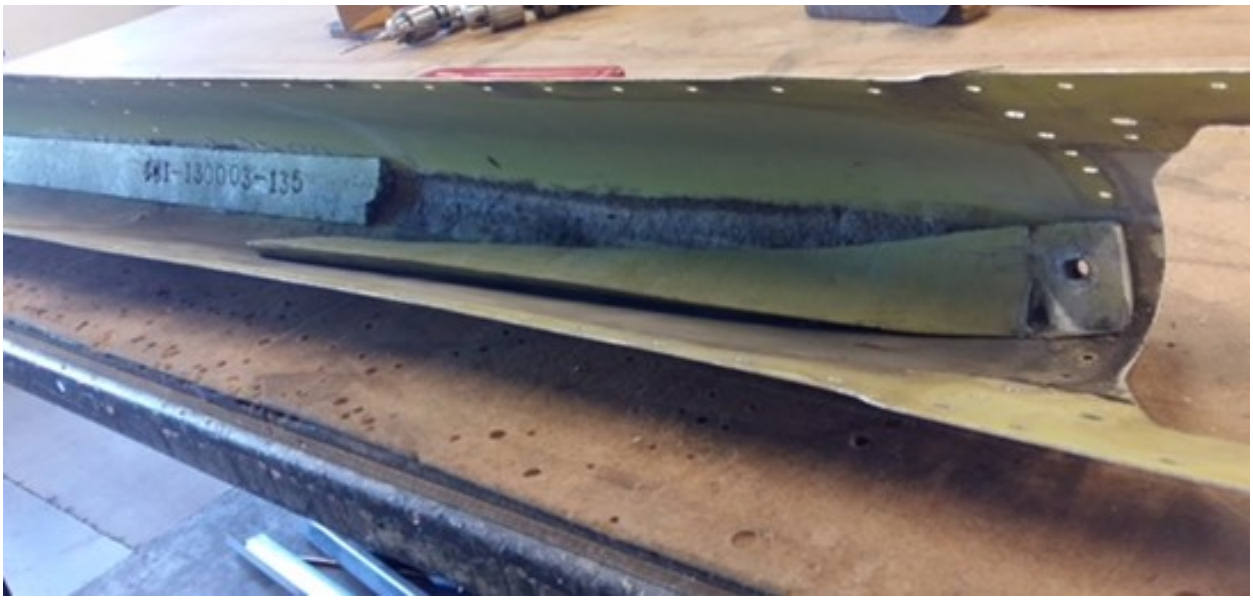
It is important to note, flutter is a phenomenon that can occur when an aerodynamic surface begins vibrating. This can lead to failure of the control surface.

Other factors that could cause or contribute to control surface flutter:

- Improper tension on control cables
- Improper attachment security
- Balance out of limits
- Any other loose condition in the empennage

The addition of a loose aileron balance / nose weight dampener could contribute to this type of situation.

Pilots and maintainers are reminded of the importance of a thorough pre-flight inspection.



Example of a B300 Cracked Aileron Weight

Boeing, 737 8

Leaky Line

SDR #: 20190225014

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

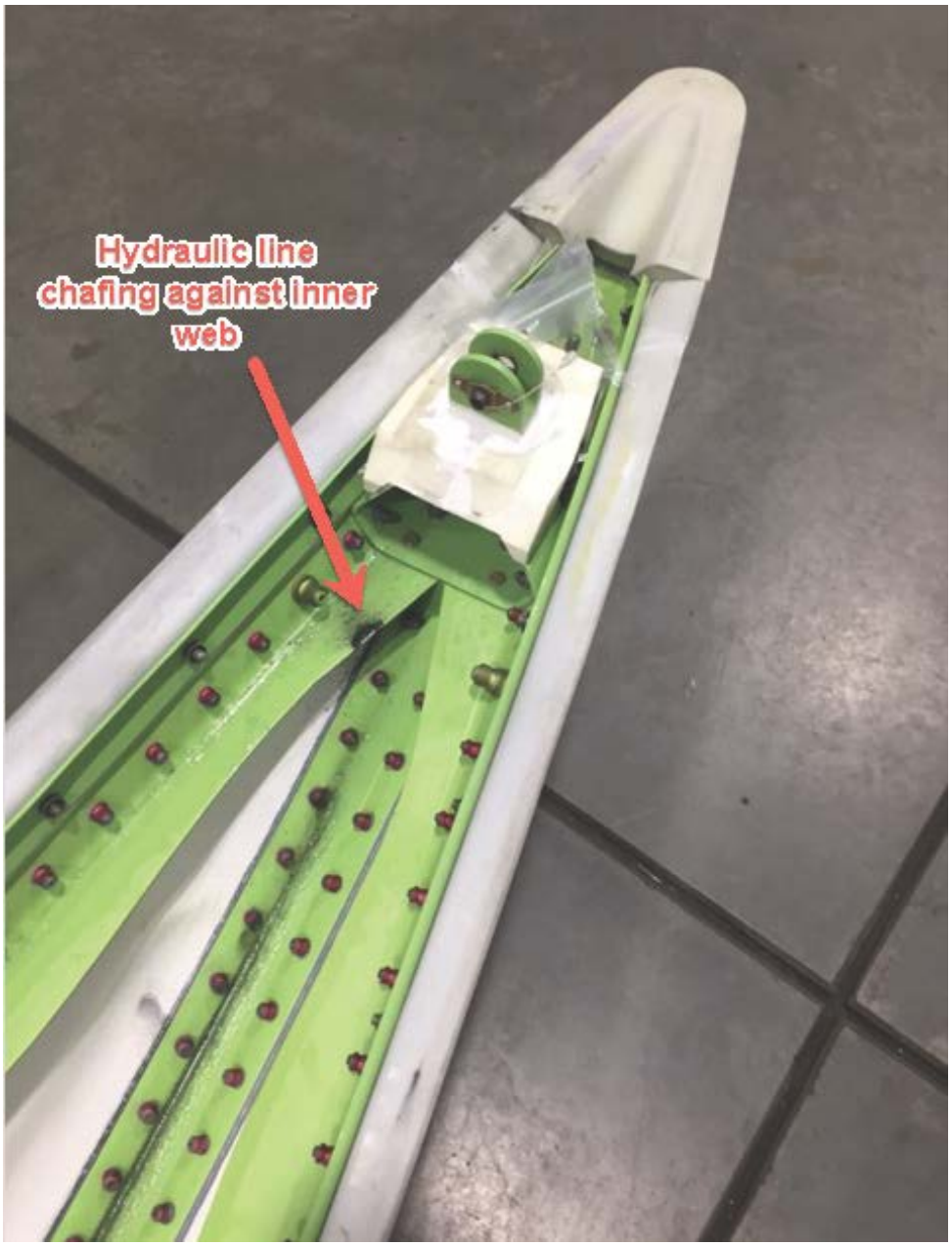
Maintenance found system "A" hydraulic quantity at 60%. Upon inspection, fluid was found leaking from the #1 engine aft fairing drain tube at a rate of approx. 4 drops/sec.

Hydraulic supply line was found chafed from contact with the aft strut fairing. Hydraulic line was replaced and leak checked serviceable.

Transport Canada Comments:

Even new aircraft may have surprise leaks. When installing components or performing visual inspections, maintainers are reminded to be diligent for potential chafing between lines, conduits, hoses, electrical harnesses, structure, etc. Maintainers are also reminded to wear all the proper personnel protective equipment while working around Skydrol and all other harmful chemicals used on aircraft.

Pic 1: Location on wing of leaking line



Pic 2: Chafe mark on inner web of fairing

Pic 3: Chafe mark on line with hydraulic fluid spraying from hole

Bombardier, BD 500 1A10/1A11

CS100/300 - Damage Found on Left-Hand Main Landing Gear Upper Door

SDR #: 20180412003

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

The left main landing gear (MLG) auxiliary door was damaged, the actuating rod was broken and the wing lower surface was found damaged. The flight crew also reported damage on MLG door to be inspected by Maintenance (missing material) and Maintenance confirmed damage found. A damage assessment was performed and a report was sent to Bombardier requesting further action and repair advice.

Transport Canada Comments:

Following the occurrence of this and similar events, Bombardier opened an in-depth investigation and discovered that installation, adjustment and rigging issues had not been performed correctly. The fleet was inspected and four CS300 aircraft were discovered with loose fittings and one CS100 was found with a door interference issue. Additionally, one CS100 was found with a broken gear door rod, landing gear door damage and lower wing damage and is the case referenced in this article.

Bombardier carried out a fleet campaign and subsequently issued Reference Instruction Letter CS-RIL-32-0005 in October 2017. Since then, there have not been any further reports of damage similar to this event.

Figure 1: Damage to main auxiliary gear door

Figure 2: Gear door damage as seen from inside

Figure 3: Broken gear door rod

Figure 4: Damage to composite wing

Bombardier, BD 700 1A10

Overheated Nickel-Cadmium (Ni-Cad) Battery

SDR #: 20181221001

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

The Auxiliary Power Unit battery was dropping to 9 volts on start and the operator decided to replace it with his spare. When they got access to the battery, they found the battery case deformed and one of the latches seemed to have detached from the case. It was confirmed that the battery heater circuit breaker was out at the time of the event.

Transport Canada Comments:

An aircraft should never be attempted to start an engine with a dead Ni-Cad battery. Here is an example of the kind of damage thermal runaway causes. They are fortunate that it did not damage the aircraft. Proper voltage and temperature monitoring can prevent battery damage from overheating caused by thermal runaway.

Damaged battery

Bombardier, CL600 2B19 (CRJ 100SE)

CRJ100 – Cracked Right Hand (R/H) Aileron Mixer Support

SDR #: 20171031004

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

During the closeout inspection before installing the main landing gear wheel bins, the inspector found that the R/H aileron mixer support bracket was cracked and one of the three legs of the bracket was severed. Pictures attached show its location and the severed leg of the support bracket which supports the aileron control system pulleys.

Transport Canada Comments:

The area where the damage was located is not easy to inspect, and the severed support leg was behind some lines that are clamped to the attaching bolt for the support leg. The subject aircraft was a low time executive CRJ100 aircraft built in 2002 that was in for maintenance. Thorough and detailed inspection techniques were able to locate this defect before it became an issue.

Fig 1: Severed aileron quadrant support leg.

Fig 2: Location of aileron mixer and support bracket.

Bombardier, CL600 2B19 (RJ100)

CRJ 100/200 – Main Air Conditioning Duct Found Split and Leaking

SDR #: 20180514013

Subject:

Very low airflow was noted entering the cabin and flight deck with both air conditioning packs selected on. Subsequent investigation found the main feed manifold ruptured. The main feed manifold was replaced and the air conditioning system checked serviceable.

Transport Canada Comments:

The duct was found with a small split at one end and a large split at the other end. The damaged duct was replaced and the aircraft was returned to service.

Figure 1 – Small split in duct

Figure 2 – Large split in duct

Bombardier, CL600 2C10 (RJ700)

Loss of Both Bleed Air Systems Causes Emergency Descent

SDR #: 20160418012

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

At Flight Level (FL) 400, the left bleed air leak warning was displayed L BLEED DUCT on the Engine Indication and Crew Alerting System (EICAS) and the aural warning sounded. The crew commenced a descent following the procedures in the Aircraft Operations Manual (AOM). Four minutes later, just after starting the checklist corresponding to the left bleed air leak, the R BLEED DUCT warning was displayed and the aural warning sounded, indicating a right bleed air leak. The supply of the right bleed air also stopped and now both bleed air systems had stopped. The crew declared an emergency and performed an emergency descent wearing oxygen masks following the emergency descent procedures. While descending through FL170, the CABIN ALT warning was displayed indicating the cabin altitude had exceeded 10 000 feet. After completing the descent to 10 000 feet, and because there were no other abnormalities regarding passengers and aircraft, the crew chose to continue the flight and the aircraft landed without further incident.

Transport Canada Comments:

The bleed air system consists of two similar systems (left and right) that supply high temperature, high-pressure bleed air via Pressure Regulating and Shutoff Valves (PRSOV) to the air conditioning systems. The regulated air is then supplied to the pressurization, air conditioning and anti-ice systems through ducts. Each duct has (2) overheat sensing elements consisting of independent wire loop systems to detect a rise of temperature that would be caused by a bleed air leak. Each system of independent sensing elements is connected to one of the two independent channels of the Anti-Ice and Leak Detection Controller (AILC) that monitors for and provides indications of a bleed air leak. If both channels in the AILC detect a bleed air leak, the associated L or R BLEED DUCT message will appear, an aural warning will sound and the associated PRSOV will be closed, stopping the supply of bleed air. If only one channel detects a bleed air leak, DUCT MON FAULT message will be issued, which indicates there is an abnormality in the bleed air leak detection system.

In this incident, both bleed air systems stopped supplying the bleed air because the AILC detected air leaks on both bleed air systems. Following the event, it was not possible to determine why the AILC detected the bleed air leaks, although it is possible that there was either a malfunction in the AILC, an actual bleed air leak, or a sensing element malfunction. In a number of recent similar events, it has been found that the

sensing system elements have been at fault and were not properly installed and/or exhibited mild corrosion. Careful inspection and assembly is required when installing and servicing these sensing elements to prevent these types of events. The Service Difficulty Report (SDR) database contains an increased number of these occurrences so we are publishing this article to raise industry awareness.

Canadair, CL600 2B19 (RJ100)

RJ100/200 - Auxiliary Power Unit (APU) Inlet Duct Cracked

SDR #: 20171031001

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

While investigating a snag of the Auxiliary Power Unit (APU) "no start" condition and accessing the APU compartment, the APU lower inlet duct was found to be cracked with pieces of the duct wall missing.

Transport Canada Comments:

Transport Canada would like to raise awareness of this type of defect and requests that these types of service difficulties continue to be submitted through the Web Service Difficulty Reporting System (WSDRS).

Figure 1: Picture of broken APU air inlet duct

Canadair, CL600 2B19 (RJ100)

Cockpit Windshield Arcing in Flight and Fire at Terminal Block

SDR #: 20171122015

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

The aircraft was enroute and experienced a windshield heat failure. The crew noticed some arcing and then a small fire/flame near the terminal block at the lower right-hand side of the windshield. The crew turned off the windshield heat and the arcing and fire stopped. The event occurred close to the destination airport and there were no further issues after turning the windshield heat off, so no emergency was declared and the aircraft continued the flight and landed without incident. No other damage to the aircraft other than the windshield and one of the crew's checklist that was damaged by the arcing flame.

Maintenance staff, while troubleshooting, turned on the windshield heat and immediately the windshield began arcing and a small flame was seen at the terminal block. The windshield was then removed and replaced with a new part.

Transport Canada Comments:

On the CRJ 100/200/440 model aircraft, there have been a total of 314 windshield cracking events since 2006 up to early 2019. The reported windshield failures have consisted of 178 cases of left windshield cracking and 136 cases of right windshield cracking. Of these reported events, there have been at least 39 cases of windshield heat arcing, sparking, burning smell or smoke. So far only one arcing case has resulted in actual flames in the cockpit. The checklist was on the glare shield in close proximity to the arcing terminal block which may have contributed to the flames that were observed. In many of the Service Difficulty Reports (SDRs) of windshield arcing, the crew noted that sparks or sparking was seen. The subsequent crew actions to quickly turn off the windshield heat may have prevented these sparking events from growing into more intense burning situations.

The subject of windshield arcing and cracking was published previously in 2013 and windshield sealing to prevent water ingress was noted as the cause in that article. How the window cracking occurred was not investigated in this event. It is quite possible that water ingress caused the initial arcing and subsequent cracking of the windshield. Figure 3 is from the 2013 Feedback article and shows an eroded windshield outer seal that gets worn over time by the airflow. The foggy area seen at the bottom of the windshield near the heating elements is due to water ingress. Attached figure 4 is from another SDR event and also shows a water ingress foggy area near the terminal block.

Aircraft Maintenance Manual (AMM) 56-11-01 notes, *"…inspect the outboard moisture seal for cracks or erosion… and repair if necessary…"* This is a reminder to all owners, operators and maintainers of the various inspections and repairs that are available to prevent such occurrences as seen in this article.

Figure 1: Lower right corner showing burning on the windshield.

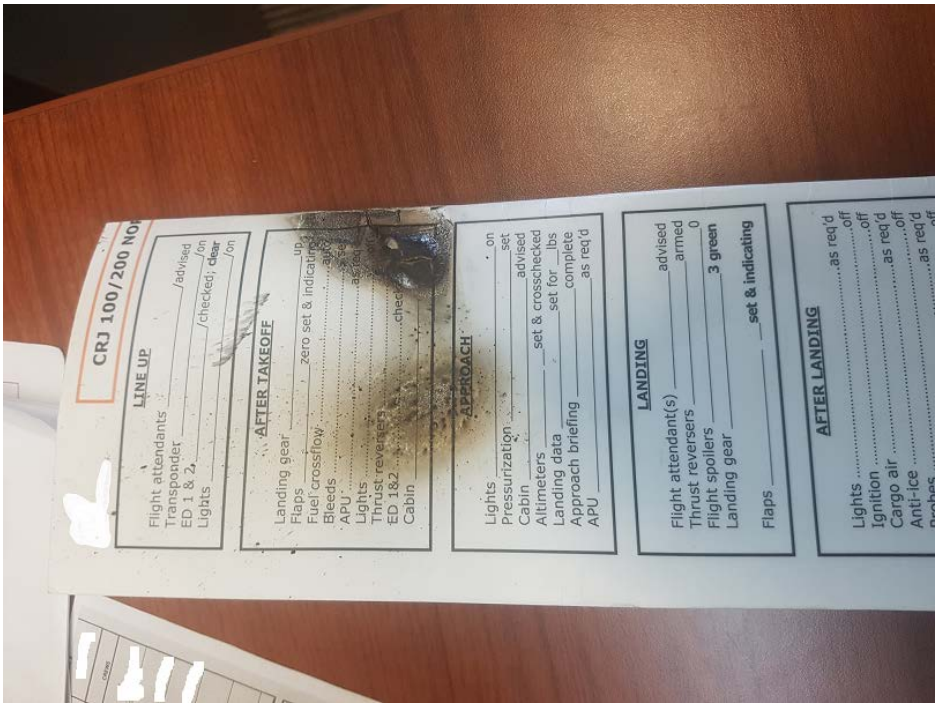


Figure 2: Pilot checklist shown burns caused by arcing.

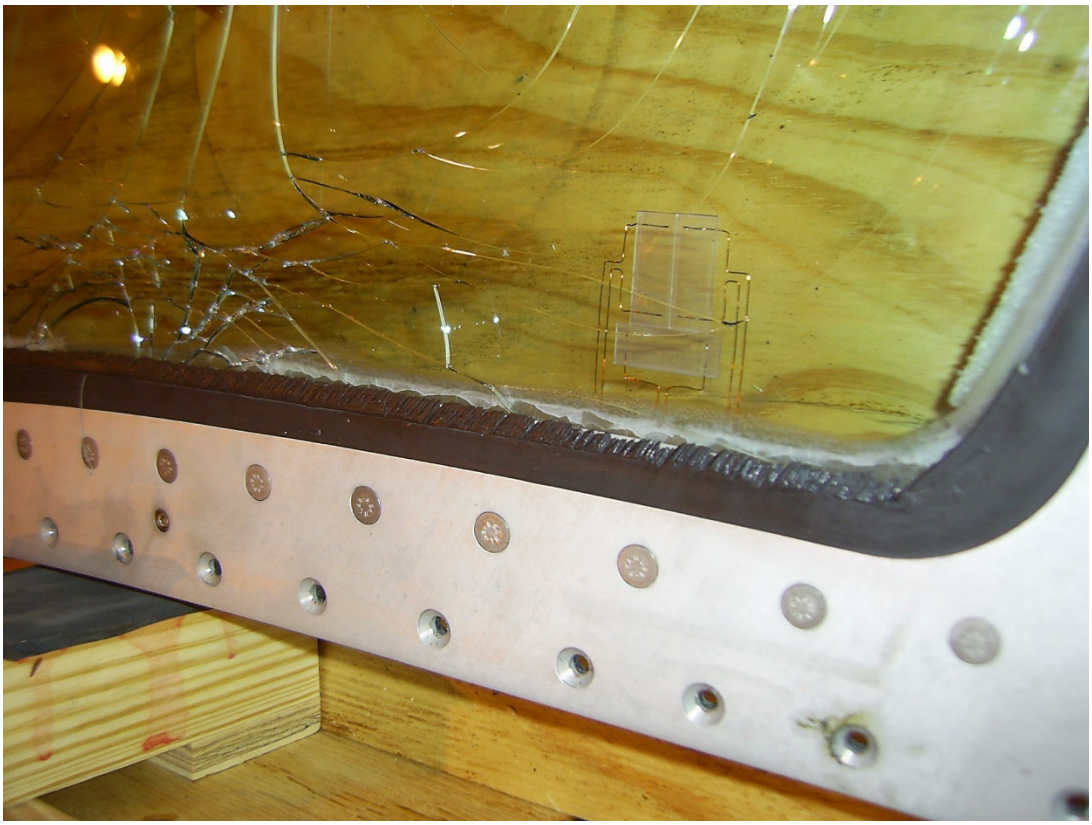


Figure 3: Picture from 2013 Feedback article showing eroded window seal and foggy area caused by water ingress.

Figure 4: Another SDR event showing windshield water ingress foggy area.

Cessna, 172N

Cessna 172 Fuel Selector Valve Inspection and Maintenance

SDR #: 20181015017

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension

During flight, the pilot noticed fuel imbalance despite fuel selector in "BOTH" position. The Left-Hand (LH) fuel supply was significantly lower than the Right-Hand (RH) one. Reported to maintenance as per standard process, who discovered the ball-detent had separated from the fuel selector valve shaft, causing the actual fuel selector position to be on left only. This was caused by the breaking, due to wear, of the ball-detent, as part of the 'knee'-shaft assembly between the fuel selector handle and the fuel valve. Item replaced and aircraft released as per the standing procedures.

Transport Canada Comments:

Several related Service Difficulty Reports (SDRs) have been reported, including:

- Engine power loss due to incorrectly positioned fuel valve – excessive wear
- Engine power loss due to incorrectly positioned fuel valve – selector stiff
- Engine power degradation, 20-30 seconds after advance to full power – detent wear

Cessna published Service Letter SE71-10 in 1971 highlighting the importance of regular inspections of the fuel selector valve and drive shaft linkage. Transport Canada would also like to emphasize the following points contained within the Service Letter:

- Valve control detent plate for cleanliness and excessive wear
- Drive shaft attach points for security, binding, excessive wear and lubrication
- Operate valve handle through all positions and check for proper operation, detent feel, and freedom of movement

Cessna Model 172 Series Service Manual recommends – Each 100 Hours:

Fuel Selector Valve – Check controls for detent in each position, security of attachment, and for proper placarding.

Excessive wear resulting in drive shaft disconnect

Cessna, 208

Cessna 208 Cracked Lower Wing Strut Fitting

SDR #: 20190425034

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

During a scheduled wing strut eddy current inspection (5-15-MA), required every 5000 hours, one of the left strut lower fittings was found cracked and separated at the time of strut removal while preparing for the inspection. The last compliance of this inspection was at 6150 hours, completed on January 31 2007.

Transport Canada Comments:

Further investigation into this occurrence revealed that the operator had been operating the aircraft using "Typical" inspection time limits. Due to this aircraft being operated on floats, "Severe" inspection time limits should have been followed.

The Federal Aviation Administration (FAA) has published a General Aviation Maintenance Alert titled Cessna 208 Upper and Lower Wing Strut Fittings to highlight the importance of inspections in this critical area. https://www.faasafety.gov/gslac/ALC/lib_tableofcontents.aspx

Operators are reminded that mandatory replacement times and inspection intervals may be dictated by the type of operation. In this case, “Typical” and “Severe” are defined in chapter 4-00-00 Airworthiness Limitations section Model 208/208B Maintenance Manual.

Photo 1 Lower Wing Strut Fitting Top View

Photo 2 Lower Wing Strut Fitting Side View

Dassault, Falcon 900EX

Falcon 900 - Main Wheel Found Missing After Landing

SDR #: 20170815003

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

The aircraft landed uneventfully but the crew reported a significant loss of braking action. During the crew walk around after landing, the right outboard main wheel assembly was noticed to be missing. The missing wheel assembly was subsequently found at the departure airport and is being returned to the operator's maintenance base for further evaluation. The crew said they did not see any other damage.

The initial findings by maintenance personnel noted that all of the attaching hardware and locking devices were still in place. It appears that the outer bearing disintegrated and the wheel bearing cup diameter is sufficiently large enough that the wheel can pass over the retaining hardware. The aircraft manufacturer has been advised and the affected main gear assembly is being replaced by a manufacturer's repair team.

Transport Canada Comments:

The event was investigated and concluded that it resulted from an outboard bearing cone failure. The parts were sent for investigation but due to the high level of damage of the outboard bearing cone, it was impossible to isolate one specific root cause.

The most probable causes are improper tightening of the wheel to axle nut (under-torqueing), or improper inspection of the condition of the bearings during the last wheel installation (140 Flight Cycles (FC) before the event). The inboard bearing cone was found normally lubricated, so a lack of bearing grease in the outboard bearing cone is not suspected.

Transport Canada wants to remind all operators that installation of aircraft wheels must be performed strictly in accordance with the Aircraft Maintenance Manual's (AMM) instructions.

Fig 1: Axle showing bearings still there and wheel missing.

Fig 2: Wheel after being found.

Fig 3: Inside of wheel showing residual materials from broken bearing. Note the different sizes of bearing races with larger diameter inner bearing.

DeHavilland - CAN, DHC 6 300

Aileron Servo Tab Control Rod Crack

SDR #: 20150312008

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

During routine maintenance activities, the Aircraft Maintenance Engineer (AME) noticed a crack in the aileron servo rod. This same cracked area on the rod was also swollen. It is suspected that water accumulated inside the rod and froze. The aileron rod was replaced with no additional defects noted.

Transport Canada Comments:

The ingress of water and freezing of the Viking Air Limited (VAL) DHC-6-300 aileron servo tab control rod assembly is a known issue.

The Original Equipment Manufacturer (OEM) of the DHC-6-300 Twin Otter aircraft, DeHavilland Aircraft Company (DHC), raised awareness of the issue of water ingress and freezing of the Left-Hand (L/H) and Right-Hand (R/H) Part Number (P/N) C6CW1048-1 aileron servo control rod assemblies by issuing Service Bulletin (SB) 6/472 on January 18th 1985.

The P/N C6CW1048-1 rod assembly was constructed with a hollow tube, which could accumulate water and freeze. The freezing would expand the tube and cause it to crack. SB 6/472 was issued to introduce Modification (Mod) No. 6/1850, which called out a replacement solid tube assembly P/N C6CW1087-1.

It should also be noted that the DHC-6-300 Product Support Manual (PSM) 1-63-4 Illustrated Parts Catalogue, Chapter 27-10-00 Figure 5 – Servo Tab Installation, depicts at item 90, control rod P/N C6CW1087-27 but that is the P/N for the solid rod only, not the assembly with both rod ends installed. The complete solid rod assembly P/N C6CW1087-1 is depicted at item 35 (not illustrated). The hollow tube control rod assembly P/N C6W1048-1 (item 30) is no longer procurable (NP), nor are the older P/N DSC4-3A rod ends (item 80).

Transport Canada Civil Aviation (TCCA) recommends that DHC-6 operators and maintainers consider inspecting their fleets to see if they still have the older P/N C6CW1048-1 hollow tube control rods installed and if so, incorporating SB 6/472 due to the inherent safety benefits achieved by replacing the hollow tube rod assemblies with P/N C6CW1087-1 solid rod assemblies.

C6CW1048-1 Control Rod Assembly.

DeHavilland - CAN, DHC 8 301

Dash 8/300 Secondary Flap Drive Shaft

SDR #: 20180711016

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

Flaps at 5 degrees and will not move. Flap drive caution is on. Secondary flap drive shaft (over fuselage) found seized and sheared. Drive shaft assembly removed in accordance with Aircraft Maintenance Manual 27-52-11 page 201. Coupling also found seized and bearing had failed. The complete secondary flap drive path was replaced.

Transport Canada Comments:

This drive coupling failed due to lack of lubrication. Aircraft operating environment has an impact on components that are sealed if the seals fail and let moisture in. These areas are very hard to inspect for preventive maintenance. Operators should track the reliability of these components and replace them at a predetermined interval that suits their operating environment.

Coupling without any lubrication.

DeHavilland - CAN, DHC 8 311

Cracked Bleed Air Pipe Flange

SDR #: 20180913014

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

There was a 27 degree engine Inter-Turbine Temperature (ITT) rise with number one bleed selected on and air cycle machine (packs) off. Suspect leak between left-hand check valve and engine shut-off valve. Found a cracked flange on the bleed air duct.

Transport Canada Comments:

Cracks on ducts can be hard to find when they are hidden under clamps. Sometimes some disassembly will be required to find the damage. Also some parts are known to fail on regular intervals which makes troubleshooting easier if the person doing the work is familiar with the aircraft model.

Cracked flange on the pipe

DeHavilland - CAN, DHC 8 311

Jammed Elevator Trim

SDR #: 20181011008

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

While positioned on the ground, the flight crew reported to maintenance that the elevator trim wheel was stuck. When the aircraft maintenance engineer (AME) investigated the elevator trim system, it was found to be jamming on the captain's side of the centre pedestal in the cockpit. The screw holding the indicator needle to the lay-shaft assembly was backed out and contacting the structure. This caused the elevator trim indicator to be disengaged from the captain's trim wheel indicator track. This discrepancy was rectified as per the Dash 8 Aircraft Maintenance Manual and Illustrated Parts Catalog.

Transport Canada Comments:

These screws are located in an area that is not accessed often and is easy to miss. Maintainers should make sure that free movement of the control levers or trim wheel is not restricted by loose parts. Also, when working in this area make sure that the screws and bolts have the correct torque when replacing parts.

Image shows the screw backed out from the lever.

DeHavilland - CAN, DHC 8 402

Damaged Fuel Ejector Check Valve

SDR #: 20190905009

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

Crew reported a #2 engine fuel press caution light during climb when turning off #2 auxiliary pump. Maintenance replaced the right-hand primary ejector pump and the aircraft returned to service. A damaged check valve was reported on the removed pump.

Transport Canada Comments:

Broken ejector pump check valves are hard to troubleshoot since disassembly is required to find the failed parts. However, this type of failure can be expected to be found on older aircraft because moving parts do wear out and require replacement when they fail.

Photo: Ejector pump and damaged check valve

Dornier, 328 100

Ballast Fire Creates Exciting Flight

SDR #: 20190121014

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

An indication of a cargo fire was reported and a tactile search was performed. The captain advised that they would go through their checklist and may have to declare an emergency. The pilot was then informed of the fire extinguisher going off, he declared an emergency and asked if there was smoke in the cabin, to which the flight attendant confirmed that there was no smoke or fire. The pilot advised that he would conduct a normal landing and wait for fire crews. Maintenance found the ballast smelt, and when it was removed, it showed internal signs of a short and had an intense smell of electrical burn.

Transport Canada Comments:

The quick reaction and persistent approach the flight attendant took in this case prevented what could have been a very different outcome. It can sometimes be difficult to pinpoint the source of electrical fires/smoke like in this case. Often, electrical components are buried behind sidewalls or under floor. During routine maintenance, a thorough inspection of these components could prevent inflight emergencies.

Pic 1: Internal view of Emergency Light Ballast. Notice the charred internal components.

Pic 2: Scorching and heat residue on the inside surface of the Ballast cover.

Pilatus - SW, PC12 47E

Improper Wiring Practices

SDR #: 20190329033

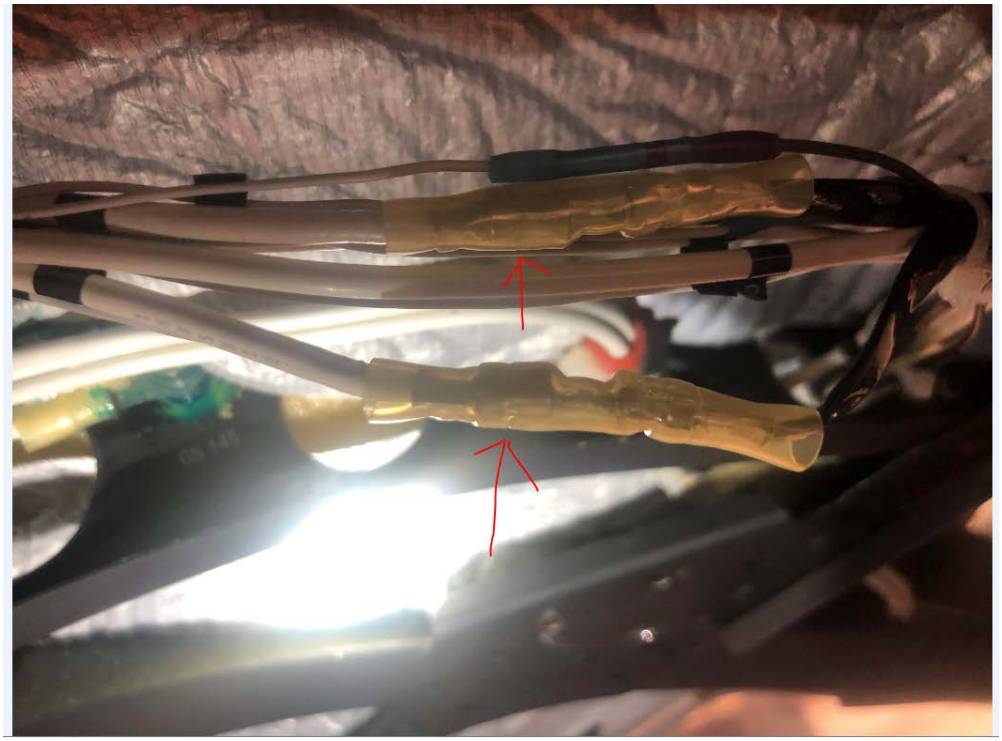
Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

During a routine inspection of the windshield heat wiring and splice crimps, it was noted that the left-hand pilot windshield wires were crimped improperly. This is what this inspection was designed to look for, after finding some windshields that were installed improperly. The two separate splice crimps were found to have been crimped backwards.

Transport Canada Comments:

This special inspection proved its worth. Sometimes routine maintenance can seem mundane and uninteresting. This particular maintenance staff was able to find the exact issue the inspection was calling out. Following procedure and being attentive during inspections can save a crew from an inflight failure.



Pic 1 - Improperly spliced wiring

Pic 2 - Properly spliced wiring

Engines

Pratt & Whitney - USA, PW1524G

PW1524G Pinched O-Ring

SDR #: 20190328006

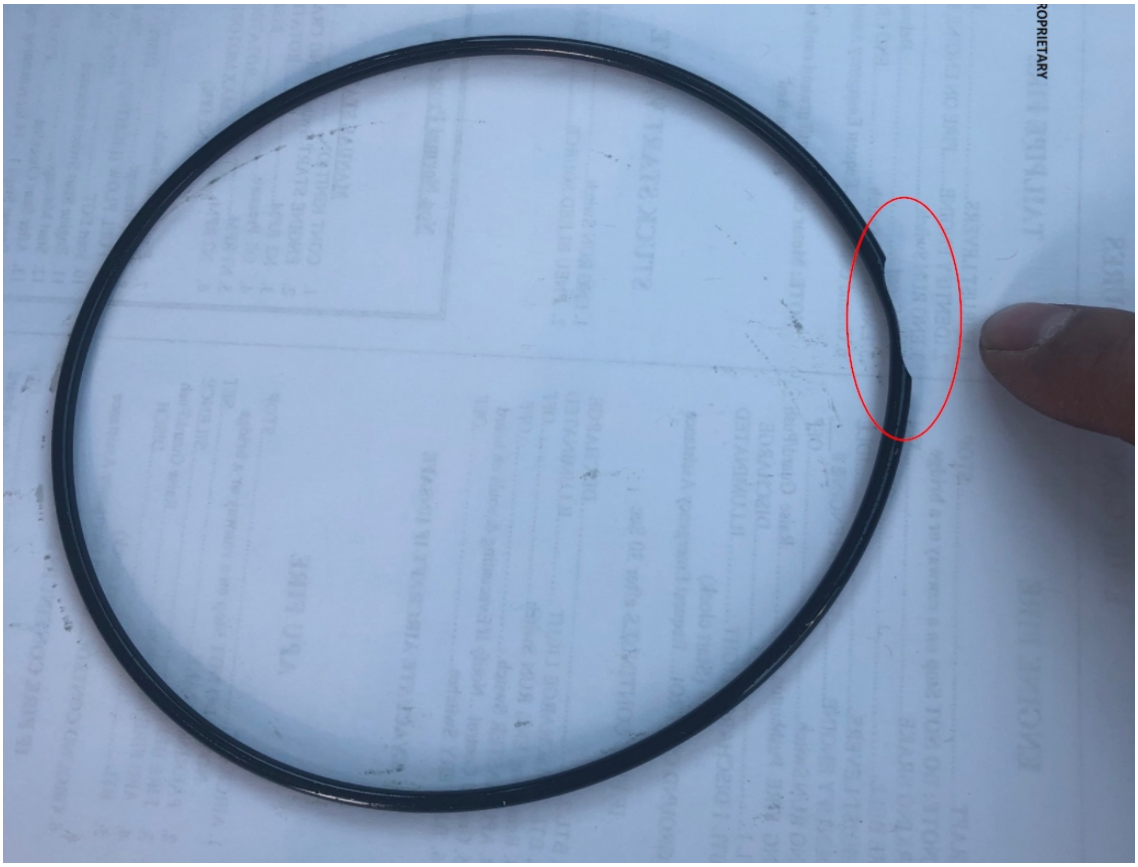
Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

Inflight shutdown on the way back to airport. Initial general visual inspection revealed the engine was wet around the oil filter. Oil debris monitor limit posted previous day and maintenance carried out at night to replace oil debris monitor. Chip detectors and oil filter checked for debris. Preliminary report from Approved Maintenance Organization (AMO) indicated oil filter not installed correctly causing pinched O-ring.

Transport Canada Comments:

This event appears to be a “human factors” related issue and serves as a valuable reminder for maintainers to be diligent even when carrying out some of the most basic maintenance tasks. This Service Difficulty Report (SDR) highlights the importance of post maintenance procedures such as engine run ups and leak checks, verifying for correct part numbers, and adherence to instructions for O-ring lubrication prior to installation. Transport Canada supports and recommends the replacement of used O-rings after each use. Documenting and investigating events such as these through a Safety Management System (SMS) program could assist in determining a possible means of prevention in aviation organizations.



Example of Pinched O-ring

Rotorcraft

Aerospatiale HC, AS 355NP

Cracked Tail Rotor Drive Shaft Support Bracket

SDR #: 20150330010

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

Following an inspection of our AS 355NP, two cracks on the forward tail rotor drive shaft bracket were found between the short and long shaft.

The flange had play because of the nut being loose and was likely the cause of the cracks due to the excessive vibration. The bearing appeared to be running dry.

The flange assembly was sent for repair and the worn and damaged parts were replaced.

Transport Canada Comments:

This Service Difficulty Report serves as a reminder to inspect all areas of the aircraft including the items in the post-flight inspection. The cracks may have been caused by the lack of grease in the bearing but detection prior to failure was definitely a break in the chain of events. Routine servicing can play a vital role in safety and serviceability of your aircraft.

Example of the crack found in the flange.

Bell Textron - CAN, 429

Pitot-Static System Fittings Loose Hardware

SDR #: 20161121001

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

While performing a 24 month pitot-static check, it was discovered that many pitot-static B nuts were only finger-tight and could be loosened by hand.

Transport Canada Comments:

Transport Canada has received several service difficulty reports for the Bell 429 model helicopter with loose hardware on the pitot-static system. The loose hardware was investigated and found to be the result of incorrect tightening of the plastic fittings. Subsequently, Bell has amended the torque procedures for all plastic fittings in the instructions for continued airworthiness. Be aware that the torque values identified as standard practices can be different than the manufactures' instructions for a specified task. The Caution and Note sections for each procedure should be read carefully and adhered to as they may differ from one job to the next.

Example of the plastic fittings that can be found in a pitot-static system.

Robinson, R44 II

Concorde Battery Electrical Short

SDR #: 20190318029

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

The pilot returned to base and reported having to re-set the alternator after the light had illuminated several times in flight. The aircraft was due for a 100 hour inspection anyway, so the inspection was carried out. During the 100 hour inspection, it was found that the battery under the co-pilot seat was melted in two places. The alternator was close to overhaul, so it was replaced as a precaution. It can't be sure that the battery caused the alternator issues, but it appears the battery shorted internally. The pilot did not report any odd smell in the aircraft.

Transport Canada Comments:

Concorde batteries can be commonly found installed in many different aircraft makes and models. Inspection instructions for the battery are often found in the aircraft manufacturer's publications; however, it is important to note that battery manufacturers also publish instructions for continued airworthiness. The instructions for continued airworthiness for the battery should be consulted when each maintenance program is developed. For this battery installation, no internal checks are required and it appears that no external defects were noted prior to the battery failure. If a similar situation is encountered, Transport Canada encourages operators and maintainers to continue to submit Service Difficulty Reports in order to further evaluate this potential defect.

Image 1: Battery as it was found during inspection when it was installed in the aircraft.

Image 2: Battery opened for inspection and the subsequent electrical short observed.

Robinson, R44 II

Defective R44 II Engine Air Induction Hose

SDR #: 20190611012

Subject:

Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

During a scheduled maintenance of an R44 II, it was noted that Robinson Helicopter Company (RHC) Service Bulletin (SB) R44 SB-97 Part A (required within one flight hour) had not yet been accomplished. Visual inspection of the installed hose part number (P/N) A785-31 found evidence of separation between inner and outer layers as described in the SB. The "crinkling" noise was also evident. The defect was reported to the manufacturer (RHC), with two pictures and an audio file to confirm the "crinkling" noise as the indication of the defective hose. It was also noted to RHC that this particular P/N A785-31 hose did not fall within the effectivity range of R44 SB-97 (as the aircraft serial number was not applicable, and the hose was installed prior to the "may through November 2018" effectivity range). It is unknown if, though probable, this specific hose is "original equipment since aircraft manufacture". Robinson's technical support replied to the email and requested the discrepant hose be returned to RHC for evaluation which we will comply with.

Transport Canada Comments:

RHC issued SB-97 as a corrective action following reports of separation between the inner and outer layers of the engine air induction hose. The separation of the inner layer could block engine induction air flow. The Federal Aviation Administration (FAA) has mandated SB-97 with Airworthiness Directive (AD) 2019-12-18. Service Difficulty Report (SDR) 20190611012 describes the identification of a defective hose however, the aircraft serial number and installation date of the air induction hose are not within the required actions of FAA AD 2019-12-18. Transport Canada Civil Aviation (TCCA) has subsequently contacted the FAA regarding AD 2019-12-18 with this information. At the time of writing, this is the only SDR of a defective air induction hose. TCCA will continue to monitor and would like to remind operators and maintainers to submit an SDR for any reportable service difficulty found.

Image showing the inner layer of the engine air induction hose.

Equipment Airworthiness Directives (ADS)

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 at: *www.tc.gc.ca/cawis-swimn*

To view the most recently published Equipment Airworthiness Directives (ADs), click here or go to this website http://www.tc.gc.ca/eng/civilaviation/certification/equipment-airworthiness-directives.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). 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 Notifications (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). http://ad.easa.europa.eu/sib-docs/page-1

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

Service Difficulty Reports (SDR)

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 (SDR), click here or go to this website http://www.tc.gc.ca/eng/civilaviation/certification/service-difficulty-reports.html