Feedback

Canadian Aviation Service Difficulty Reports

The following content was published between August 14, 2019 and December 31, 2019

Table of Contents

Fixed Wing

Learjet, 45

Loss of Hydraulic Fluid Can Lead to Complete Hydraulic Failure

SDR #: 20180914008

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.

Aircraft was in the Climb Out when the crew received Engine Indicating and Crew Alerting System (EICAS) messages: MAIN HYD QTY LOW, MAIN HYD PRESS, and LH HYD PUMP.

Hydraulic pressure had dropped to 100-150 Pounds per Square Inch (PSI) with the Left-Hand (LH) pump flashing amber on the hydraulic synoptic page. The crew declared an Emergency and returned to the airport for an uneventful landing. Maintenance found the LH main low pressure switch S9 connector body to have bulged and failed, causing a large leak and subsequent loss of fluid.

Transport Canada Comments:

Loss of hydraulic fluid can lead to complete hydraulic failure. Main and Auxiliary Hydraulic systems share the same reservoir, loss of fluid may render both unserviceable. As well, cavitation can damage hydraulic pumps which can be very costly. Learjet Service Bulletin

(SB) 45-29-17 was issued in 2010 and is currently at revision 2. The SB subject matter recommends replacing low pressure switches in the main, auxiliary and spoiler systems. Transport Canada Civil Aviation (TCCA) recommends that operators follow the manufacturer's recommended Service Bulletins.

Pic#1 – Low pressure switch S9 leak

Pic# 2 - Bulge in connector body and subsequent protruding O-ring

De Havilland - CAN, DHC 8 102

Failed Parking Brake Control Valve

SDR #: 20180226023

Subject:

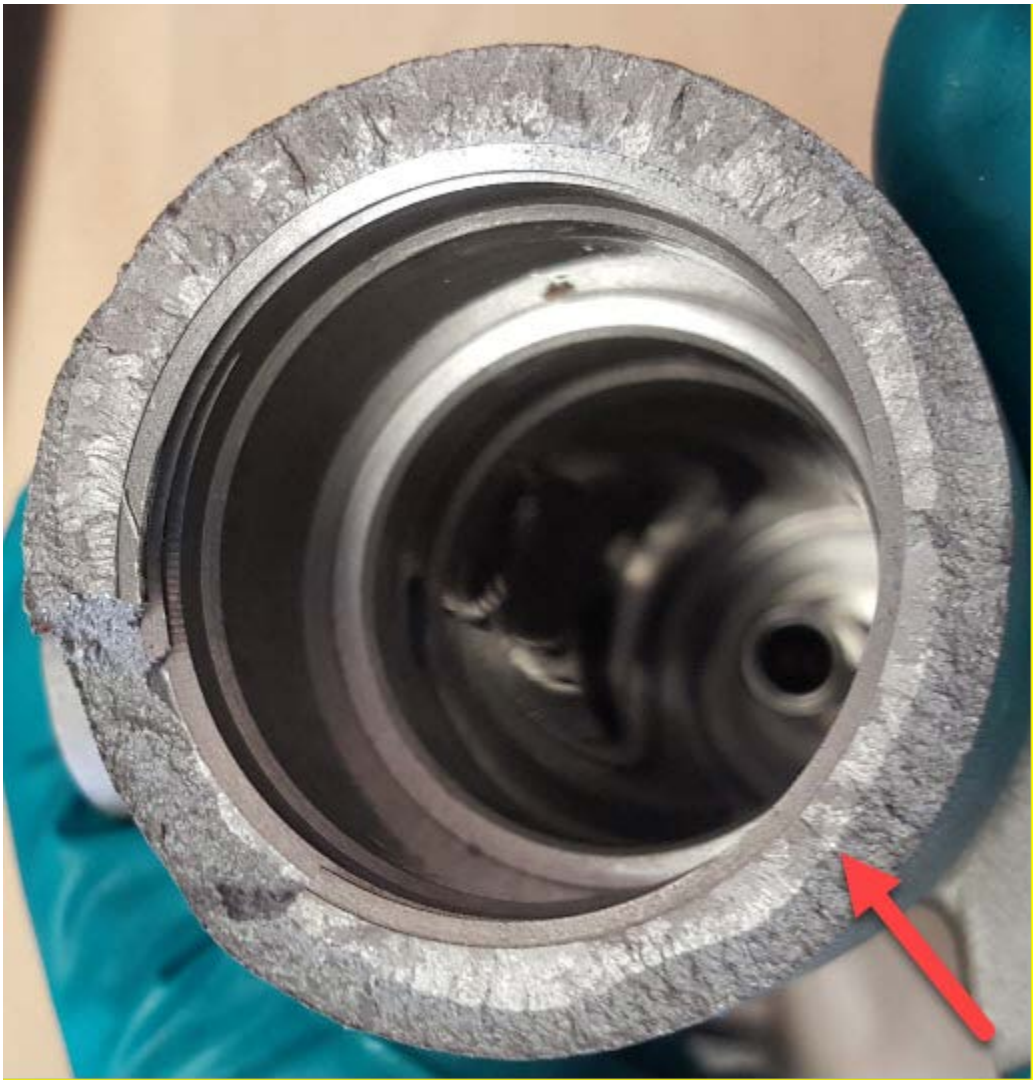
Minor edits have been made to the text below taken from the Service Difficulty Report's Problem Description. Transport Canada Civil Aviation reserves the right to edit for spelling, grammar and punctuation to increase comprehension.

During parking, when applying park brake #2, the hydraulic gauge went to zero and a large amount of hydraulic fluid was running down the right side of the aircraft. Inspection of fuselage panel 264BR revealed the brake control valve was severed. Park brake control valve was replaced with a serviceable unit, in accordance with aircraft maintenance manual chapter 32-44-16. Inspection of the failed part revealed the part

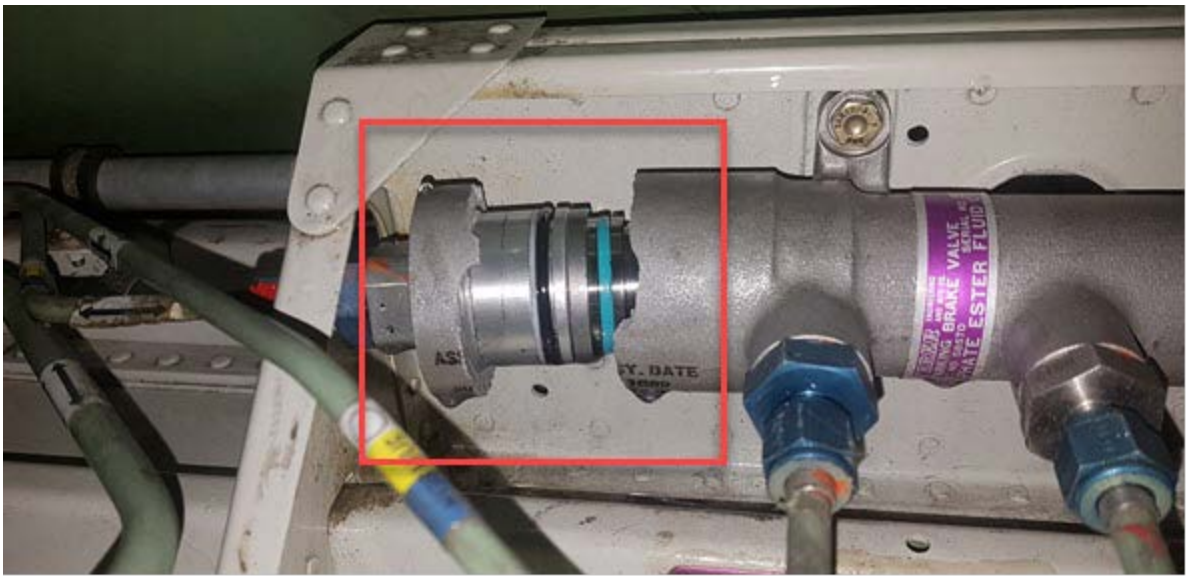
failed in 2 stages, an initial crack extending around the cylinder, followed by subsequent catastrophic failure of the cylinder. The stamp on the outer cylinder of the brake valve indicates that it was originally assembled in 1Q89 (assumed to be 1st quarter 1989) and cure date of 3Q87 (assumed to be 3rd quarter 1987).

Transport Canada Comments:

This is a typical fatigue failure that started progressing slowly and then finally failed. These types of failures are hard to detect even if the part is sent for overhaul, unless nondestructive testing is used to detect the cracks before failure. If the same part keeps failing after a certain number of cycles, a recurring defect report can be used to determine the life limit of the part and remove it from service before failure.



1. End view of the valve where you can see how the crack progressed.



2. Failed valve body as found in the aircraft.

Bombardier CL600 2D24 (RJ900), CL600 2D15 (RJ700)

Generator Feed Cables Found Chafing in Pylon Area

SDR #: 20160602006 & 20160721044

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.

After opening the cowlings for troubleshooting a generator snag, burn damage was discovered on the left hand (LH) lower thrust reverser fireshield. Further inspection revealed that the damage was actually caused by arcing of the internal drive generator (IDG) #1 power feeder cables. The power cables were chafing on the fasteners when the panel was closed and had worn through the insulation causing the arcing to occur.

Transport Canada Comments:

The fasteners on the LH lower fireshield panel were found contacting the generator power feed wire bundle and had worn through insulation causing arcing and burn damage to the wiring. The arcing occurred adjacent to the engine main fuel line causing at least one of the fasteners in the fireshield panel to almost melt away. Bombardier was advised and the investigation found that the wiring had not been installed correctly per the aircraft technical publications documents.

A similar occurrence was also reported on the RJ700 model aircraft series. The submitter advised that IDG cables were not routed correctly and that the oil raft bracket assembly part number CN628-0126-003 was missing. This event was also the result of an installation error.

Transport Canada is publishing this article as an awareness to operators to use care when installing wiring to prevent instances where chafing can occur.

Fig 1: RJ900 - Nacelle location of wire chafing on panel fasteners

Fig 2: RJ900 - Burnt wires next to fuel line

Fig 3: RJ900 - Fastener damaged by arcing

Fig 4: RJ700 – Damage to wires

Fig 5: RJ700 – Damage to fastener and panel

Bombardier, CL600 2B19 (RJ100)

CRJ 100/200 – Nose gear strut corrosion and pitting under steering collar

SDR #: 20171005003

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.

A popping sound was heard from the nose wheel steering when the nose wheel was turned. The sound was coming from the steering collar on the nose gear. While replacing the steering collar and sleeve on the nose landing gear, pitting and gouges were found on the shock strut tube. The damage was assessed and was bad enough that the shock strut was replaced.

Transport Canada Comments:

The nose landing gear strut time since last overhaul (TSO) was just 13 980 hours when this damage was discovered. This is approximately 3 ½ to 5 ½ years in service for this model of aircraft depending on operator utilization. The gouging and pitting damage was caused by fretting between the steering collar and the strut, and may have occurred due to lack of grease. The damage was so severe that the shock strut tube required replacement before the 20 000 cycle overhaul limits were reached.

The steering collar lubrication task interval, as per the Maintenance Review Board Report (MRBR), is due every 500 hours air time. Proper application of the specified lubricants at the prescribed intervals are designed to prevent this type of damage from occurring. In severe service environments more frequent lubrication is required.


Corrosion ?
Max Depth .010"

All 3 photos: Pitted collar area which is now showing corrosion

Bombardier, CL600 2B19 (RJ100/200/440)

CRJ 100/200/440 – Rear Wing Spar Deep Corrosion

SDR #: 20170501008

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 cleaning and prepping for painting and sealing after completing the Repair Engineering Order REO 601R-57-21-2562, this corrosion area was noticed, forward of the left main landing gear trunnion on the rear wing spar. It is at the base of the spar where it meets the left-hand lower wing plank in the lower web area at wing station 52. The operator contacted Bombardier for repair instructions and was advised to blend out the corrosion. They found the corrosion very deep and after all the corrosion was removed, the blend was approximately 0.430 inches deep and the remaining spar material thickness was 0.079 inches. Bombardier issued a temporary repair to add a repair angle inside the tank to repair the spar until the next C check, when the final repair will be accomplished, to either splice or replace the damaged wing spar.

Transport Canada Comments:

The corrosion found was very deep and the location is often very dirty and not easily inspected. Currently no other Service Difficulty Reports have been submitted for similar defects. Transport Canada would like to raise awareness of this issue and remind operators and maintainers to report any similar findings via the Web Service Difficulty Reporting System.

Figure 1 – Corrosion as seen before repair.

Figure 2 – Damaged area during blend-out

Figure 3 – Final blend-out of corrosion damage

Bombardier, BD 500 1A11

#1 Engine driven hydraulic pump leak causes loss of system fluid.

SDR #: 20170918002

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 #1 hydraulic system lost fluid in flight. The leak was traced to the left engine driven hydraulic pump (EDP) suction line quick disconnect O-ring. The #1 EDP was replaced and the suction hose assembly part number 999D0002-507 was ordered for replacement to fix the defect.

Transport Canada Comments:

In the attached figures, the O-rings are shown from (2) engine driven hydraulic pump suction lines showing shearing/shaving type of damage. The O-ring that is broken in 2 places was removed from subject aircraft. The other O-ring was from another engine that was removed from service by the same operator. The suction line from the removed engine was found to have O-ring damage when it was removed as a means to repair the in-service engine. In both cases shaving damage is evident on both O-rings.

In summary both O-rings suffered some type of installation damage and our concern is that there may be other cases of O-rings on engines still in-service with similar damage.

Transport Canada Civil Aviation is monitoring this issue, please report any similar findings through the Web Service Difficulty Reporting System (WSDRS).

Fig 1: O-ring from subject aircraft and o-ring from another engine previously removed

Fig 2: O-ring shown installed in suction line from previously removed engine

Boeing, 737 4Q8

Missing Cotter Pins

SDR #: 20170822024

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 of the flap system, it was discovered that the two bolts that attach the right hand fore flap to the fore flap sequencing carriage assembly were missing. The flap was being retained by the two attachment bushings (69-43503-1 and 69-43503-2) that remained connected to the brackets on the fore flap and the carriage fittings and the links to the mid flap.

The bolts (BACB30LJ5D12 or BACB30NR5DK12), washers (AN960PD516) and nuts (BACN10JD105) were found in the respective canoe fairings at Wing But Line 254 and 355. The cotter pins (MS24665-304) were not found.

Transport Canada Comments:

In accordance with the Canadian Aviation Regulations, Standard 571.10 (4), Types of work table, (d) Work that disturbs engine or flight controls:

That the system has been inspected for correct assembly and correct locking of any parts disturbed by the maintenance performed, including an operational check for proper sense and range of motion of the engine or flight controls has been accomplished, by at least two persons, and the technical record contains the signatures of both persons.

(amended 2010/12/30)

Information Note:

One of the signatures required by this section may be that of the person who has signed the maintenance release. Although the omission of the cotter pins did not end up causing an incident, the bushing could have migrated out of the fittings causing the loss of the flap assembly. Maintainers can institute a dual inspection system for all work performed. It never hurts to get a second look.

Pic 1: Bolt and nut found in flap canoe

Pic 2: Bushing remains in fitting holding flap in place

Pic 3: Bushing in fitting

Boeing, 727 225

Daily Inspection discovery

SDR #: 20180816015

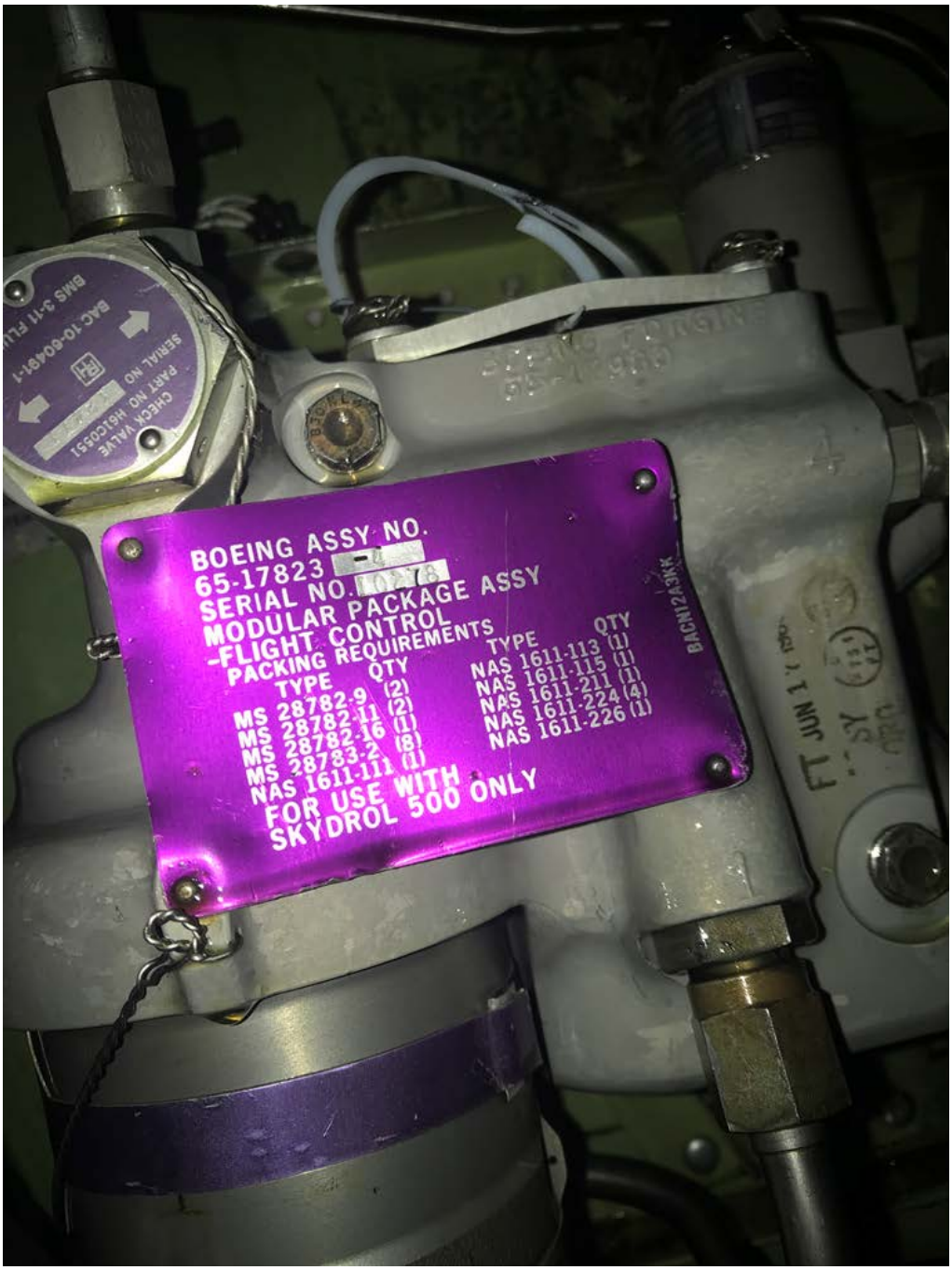
Subject:

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 daily inspection of the aircraft, a hydraulic leak was found in the aft airstair area. Closer investigation found the hydraulic "a" system elevator module had split. The failure occurred at the attach point of the valve assembly motor to the body of the modular package. The modular package assembly was replaced and the aircraft returned to service.

Transport Canada Comments:

Aging aircraft provide unique defects possibilities. Maintainers should be extra vigilant during daily inspections and other scheduled maintenance activities. The total time for the part on the aircraft was 43.9 hours and 26 cycles. The part condition of the assembly when purchased and installed was "Inspected".



Picture 1: Module assembly showing missing valve

Picture 2: Valve found hanging beside module assembly

Aerospatiale HC, AS 355F2

AS 355 - Cracked Hydraulic System Reservoir

SDR #: 20180803011

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 was in cruise flight inbound to the airport approximately 8 miles back when the hydraulic pressure light illuminated first. Shortly after, a servo light illuminated and it was followed by a limit light. After landing, a large amount of hydraulic fluid was noted on the left hand side of the aircraft. It was also noted that the fluid had come from the left hand hydraulic tank and the tank was now empty. The maintenance department dispatched an Aircraft Maintenance Engineer to inspect the aircraft. A broken weld was found on the bottom of the left hand reservoir tank. The cracked left hand hydraulic tank part number (P/N) 355A75-1330-03 was removed and replaced with a new tank. As a precautionary measure the right hand hydraulic tank P/N 355A75-1330-04 was also replaced with a new tank. Inspection of the right hand hydraulic tank welds showed some similar early signs of wear.

Transport Canada Comments:

Airbus Helicopters previously acknowledged that some cases of cracks were found on the left hand hydraulic reservoir suction line in Service Letter No. 952-29-89. The letter was published to identify the root cause of the cracking as a stressed installation of the hose. To limit this type of Service Difficulty, Airbus Helicopters advised a check of the hose installation in accordance with the Standard Practices Manual and visual checks during routine inspection intervals. Cracks found at any time on the left hand or right hand hydraulic system reservoir are considered as a reportable Service Difficulty.

Cracked Hydraulic reservoir suction line base

Engines

Pratt & Whitney-CAN, PT6A-60A

Commanded In-flight Shutdown Due to Miss-rigging

SDR #: 20171002008

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 climbing through eleven thousand five hundred feet with power set at eighty eight percent torque and prop speed at sixteen hundred rotations per minute (rpm). The flight crew heard the propeller rpm changing and observed it dropping back to eight hundred rpm and torque rising. When the torque approached redline, power was reduced to thirty percent. The torque and prop rpm stayed at around eight hundred. The aircraft was levelled off and prop was feathered. The crew elected to leave the engine running. The aircraft returned to base and landed safely. Maintenance performed an inspection and discovered the reversing cable stretched and the prop governor BETA valve was extended (out of rig.). The reversing cable was shortened (re-rigged) and engine ground run carried out. During ground run prop appeared to operate normally however it was indicating in the three to four hundred rpm range at all power settings. Further investigation revealed damage to the prop tach drive gear. The engine was removed from the aircraft and sent to a repair facility.

Transport Canada Comments:

It is believed that the engine may have been repeatedly shutdown with the power lever still in the BETA range. This could cause the reversing cable to stretch and in turn allow the BETA valve to go out of rig.

Evidence of lightning strike was found that may have contributed to the rpm fluctuations (residual magnetism was found in the prop governor).

Pratt & Whitney-CAN, PT6A-67D

Cracked Fuel Line Discovered After Fuel Seen in Engine Area

SDR #: 20170831016

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 inspection, maintenance found fuel leaking from the left hand engine. Further investigation revealed that the primary fuel pressure tube assembly (part number 3035618) was cracked at the flange area. The tube assembly was replaced, successful ground runs and leak checks performed. Aircraft was returned to service.

Transport Canada Comments:

This type of failure can be caused by many factors such as mishandling of the line, improper alignment prior to final torqueing or excessive vibration. Maintainers must be careful when working with fluid lines to avoid dangerous situations.

Excessive vibratory loads can be more difficult to detect and diagnose. Propeller balancing is an important step in reducing vibratory loads and should be carried out in accordance with the manufacturer's recommendations.

Another less obvious source of damaging vibratory loads can come from Starter Generator failures. Often when a Starter Generator bearing fails, it will put a massive vibratory load that can damage many engine components (including fluid lines). After such events, maintainers must use extra care in inspecting the entire engine for secondary damage.

Cracked Fuel line

Rotorcraft

Dart aerospace, equipment

Dart Aerospace Spacedoor Dislodged on Bell 412

SDR #: 20180306004

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.

Shortly after departing for a maintenance test flight, the right-hand cargo door dislodged and eventually departed the aircraft. Maintenance personnel describe the cargo door as dislodging from the lower cabin door track. It first came out from the aft portion then moving forward along the entire length of the door.

After a few moments of deflecting 8 to 12 inches outboard of the aircraft, the cargo door let loose of the upper track and departed the aircraft. After losing both emergency pop-out windows but prior to making contact with the rotor system, the cargo door became entangled with the external hoist, caught up where the forward emergency window would have been. After the aircraft and crew landed safely, the aircraft was inspected and determined to be airworthy.

Transport Canada Comments:

Dart Aerospace conducted an investigation and concluded that this Service Difficulty was a singular event occurrence. Subsequently, Dart issued Service Bulletin (SB) 18-1 as a precautionary measure with instructions to conduct an operational check and adjustment of the D412-694-011 Spacedoor installation. The Dart Instructions for Continued Airworthiness document ICA-D412-694 details the inspections recommended by the SB as well as the additional scheduled maintenance tasks. Operators can consult Transport Canada (TC) approved Supplemental Type Certificate SH05-10 for a list of the various aircraft type/models for the Spacedoor installation. Should any abnormalities be found with this installation, TC wishes to remind operators to submit a Service Difficulty Report for further evaluation.

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