Customer Services

Advisory Wire

REFERENCE NO:	AW300-24-0289, Rev 1	INFORMATION TYPE:	Maintenance Operational
ATA:	24	EFFECTIVITY:	Challenger 300 (20003 – 20500) Challenger 350 (20501 – 20999)
SUBJECT:	**Generator Failures During APU Start**		

1. REFERENCES:

1.1. Generator Sensor (LH), AIPC Chapter 24-61-41, (DC Hall Effect – fig. 1 / item 5)

1.2. Generator Sensor (RH), AIPC Chapter 24-61-41, (DC Hall Effect – fig. 2 / item 5)

1.3. Reference Information Letter (RIL) BD-0069, Generator Load Test Procedure

2. INTRODUCTION:

The revision of this Advisory Wire (AW) is to inform Operators about the release of the ref 1.3 Reference Information Letter (RIL) and to provide an update on the on-going investigation of the generator failure issue during APU start.

3. DESCRIPTION:

Three cases of in-flight generator failure occurring shortly after starting the APU were reported to Bombardier in the fall of 2017. The first case occurred in flight after the right engine generator had failed. When the crew initiated an Auxiliary Power Unit (APU) start, the left engine generator also failed, causing the cockpit to go dark and the ESS POWER ONLY CAS message to post. The APU did not complete its start sequence. During the descent, the left generator could not be re-engaged. The right engine generator was manually re-engaged and stayed on-line for the rest of the flight. The ESS POWER ONLY condition lasted about 2 and a half minutes.

The initial troubleshooting of this aircraft pointed to a right generator failure caused by a right Generator Control Unit (GCU) failure and the left generator failure caused by a Differential Power Monitoring Sensor No. 1 (DPMS1) failure. The replacement of those 2 parts failed to resolve the issue. Both the left and right Direct Current Power Center (DCPC) units were then replaced as a precaution and the removed units returned to the vendor for further analysis. After testing, the aircraft was returned to service. To date, no further reports of generator failure after starting the APU have been reported. As of today, both the left and right DCPC and their individual cards were tested and did not reveal a fault (NFF). Further examination of the left DCPC exposed that an unauthorized wire repair had been performed on the DPMS1 sensor (ref 1.1) connector. Testing is being performed to clarify if this discrepancy might have caused the DPMS1 sensor failure mentioned above.

The second and third cases occurred during approach shortly after the APU start was initiated. The left and right generators failed causing the cockpit to go dark and the ESS POWER ONLY CAS to post. In both cases, the APU completed its starting sequence and the APU generator came on-line automatically. Shortly after, the crews were able to manually reset both the left and right generators. The ESS POWER ONLY condition lasted about the time it took for the APU to complete its start sequence and the APU generator to come on-line automatically (15 to 20 secs).

The following discrepancies were found during the troubleshooting of both aircraft:

1. Generator power feeder cable lugs oxidized or corroded
2. Generator power feeder cable lugs under torqued at the generator terminal studs
3. DCPC terminal studs hardware under torqued
4. Hardware on generator terminal studs incorrectly installed

The left and right generator positive power feeder lugs were cleaned and reinstalled as per the AMM instructions. The same maintenance actions were performed on all the power feeder cable terminal lugs connected on the left, right and APU DCPC. A generator load test was performed on both aircraft to make sure each generator could sustain the entire aircraft electrical load without failure. Both aircraft were released to service with no subsequent reports of generator failure after starting the APU.

The discrepancies listed above contributed to the degradation in the conductivity of the left and right generator power feeder cables, resulting in a higher than allowable current unbalance in those cables when the right main battery was reconnected to the right main bus during the APU start sequence. This condition was first detected by the ref 1.2 sensor and then by the ref 1.1 sensor which resulted in both generators successively being taken off-line. This was followed by R GEN FAIL and L GEN FAIL CAS messages posted and a Differential Protection Monitoring Sensor (DPMS) 2 and 1 failure being recorded in the aircraft MDC.

The ref 1.1 and 1.2 sensors monitor the current loads on the power feeder cables of the left and right generators to prevent any permanent damage to the electrical system equipment. Any degradation of the conductivity of these power feeder cables might not have an impact during normal operation but may result in generator failures occurring when operating in abnormal configurations such as one-generator operation under heavy generator electrical loads.

4. ACTION:

No immediate action is required other than being informed of the above mentioned condition. It is recommended that operators pay special attention to the following:

1. The power feeder cable lugs connected to all generators and DCPC terminal studs should be free of any oxidation or corrosion. Any lugs found with its finish oxidized or tarnished should be cleaned or replaced.
2. The hardware on the generators and DCPC terminal studs should be installed in the correct sequence and torqued to the specified values referred to in the installation procedures of the Aircraft Maintenance Manual (AMM).

To prevent the type of generator failures described above, Operators can also perform the ref 1.3 RIL to test the robustness of their aircraft electrical system when operating under abnormal electrical system configurations. As a reminder, any generator failure should be troubleshot as soon as possible to prevent the possibility of future reoccurrence during normal operation.