Aviation Investigation Final Report

Location:	Sacramento, California	**Incident Number:**	ENG20LA016
Date & Time:	February 15, 2020, 07:42 Local	**Registration:**	N521NK
Aircraft:	Airbus A319	**Aircraft Damage:**	None
Defining Event:	Electrical system malf/failure	**Injuries:**	117 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

This incident occurred when a Spirit Airlines Airbus A319 experienced a fault with both engine integrated drive generators (IDG) while on approach to the Sacramento International Airport (SMF), Sacramento, California. These faults resulted in the loss of electrical power supplied to both electrical networks (AC BUS 1 and AC BUS 2) leading to the loss of several flight deck displays and systems. Upon the dual loss of power, the ram air turbine (RAT) automatically extended and began driving the emergency generator to provide electrical power to vital services. The airplane landed without further incident, was towed to the gate and passengers deplaned normally.

A review of the airplane's maintenance records found that the airplane had experienced a similar dual loss of power event during an approach into the Hartsfield-Jackson Atlanta airport (KALT), Atlanta, Georgia on the previous day. The airplane had also experienced a similar loss of power on three different occasions on ground while performing single engine taxi after landing in January 2020.

Each engine's IDG was controlled by an independent digital computer called a generator control unit (GCU). One of its functions was to protect the IDG and its associated electrical network by monitoring and controlling the frequency and voltage output of its respected IDG. When the GCU detects a fault, it will isolate the IDG from the electrical network, and store the system fault data in its non-volatile memory (NVM). An amber fault message will also illuminate on the respective generator control push button switch indicating the channel is offline.

Post incident analysis of information from the airplane's GCU revealed that during the incident flight and during the dual loss of power event that occurred on the previous day, both GCU's recorded fault code 145. This information indicates that the frequency output for both the left and the right engine IDGs were outside of their specified design limits during the incident flight and on the previous day. Analysis of the data also revealed a similar out of limit frequency output from the left engine IDG when the airplane experienced the three loss of power events in January.

Examination and testing of the left engine IDG revealed that an internal component, a fixed cylinder block, was significantly worn beyond its design limits. Wear was observed in the gold-colored liners assembled inside of the bores of the cylinder block. The wear was uneven around the circumference and occurred close to either end of the bores, with the heaviest wear extending up from the bottom of the bores. The gold-colored liners were worn through in some areas in several bores, and silver-colored base metal was visible. The fixed cylinder block and pistons within IDG1 were replaced with serviceable original equipment manufacturer (OEM) parts and the IDG was re-tested. The IDG passed its tests indicating that the wear on the fixed cylinder block and pistons was the reason for the IDG failure during the event flight.

Examination of IDG2 revealed that only one of the cylinder bores of the fixed cylinder block was worn through in a similar fashion to the cylinder block from IDG1. Although testing of this IDG found that it exhibited a significant frequency modulation on its electrical output, the output was not outside of its specified design limit and therefore would not have triggered a fault code 145 to be recorded on the GCU. Nevertheless, several tests showed that the fault code 145 was almost triggered under the following test conditions: 1) A constant speed (or a slow sweep profile) between 6,100 RPM and 6,150 RPM, 2) A high IDG load that seems to increase slightly with the modulation amplitude.

Although Spirit Airlines maintenance had performed troubleshooting on the airplane after each of the previous loss of electrical power events, they were unable to determine any faults with the electrical system, including the IDGs. A review of their maintenance records found that the testing included a run-up of the engines to check electrical loads per their aircraft maintenance manual (AMM), and operational testing of the IDGs. According to Airbus, the introduction section of their A318/A319/A320/A321 troubleshooting manual (TSM) indicated that if an operator cannot find a fault symptom and/or fault isolation procedure necessary to ensure the continued airworthiness of the aircraft they should contact Airbus. Airbus indicated that they were not contacted by Spirit Airlines for assistance on these loss of electrical power events. It is likely that if Spirt Airlines maintenance had contacted Airbus for these loss of electrical power events, they may have identified fault code 145 on the Number 1 GCU and replaced its respective IDG prior to the February 15th event.

As a result of this incident, Airbus has improved their TSM by incorporating steps to direct maintenance towards a direct extraction of the post flight report (PFR) and troubleshooting data (TSD) from the GCUs.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be:

A worn component within each engine integrated drive generator (IDG) resulted in the loss of electrical power supplied to several flight deck displays and systems while on approach to landing. The component, a fixed cylinder block, had significant wearing of its reworked brass liners resulting in the IDGs producing a frequency output outside of their specified design limit.

Findings

Aircraft	AC generation system - Failure

Factual Information

History of Flight

Approach-IFR initial approach	Electrical system malf/failure (Defining event)

On February 15, 2020, at about 7:42 AM pacific standard time (PST), Spirit Airlines Flight 1818, an Airbus A319-132, N521NK, experienced a fault with both engine integrated drive generators (IDG) while on approach to the Sacramento International Airport (SMF), Sacramento, California.

According to the flight crew, while the airplane was descending from 4,000 feet to 2,000 feet during their approach into SMF, they heard a “clicking noise” behind the captain’s seat that sounded like an electrical component or contactor opening or closing. They also observed the “ELEC GEN 2 FAULT” message on the lower Electronic Centralized Aircraft Monitor (ECAM) and a FAULT caption illuminate on the overhead panel. Within about 11 seconds, they heard another “clicking noise” and observed the “ELEC GEN 1 FAULT” message appear on the lower ECAM. These faults resulted in the loss of electrical power supplied to both electrical networks (AC BUS 1 and AC BUS 2) leading to the loss of several flight deck displays and systems. Upon the dual loss of power, the ram air turbine (RAT) automatically extended and began driving the emergency generator to provide electrical power to vital services.

Due to the nature of the emergency and the phase of flight, the flight crew declared an emergency and asked for an immediate visual approach to runway 34L. The aircraft landed without incident, was met by fire trucks, and safely towed to the gate where the passengers were deplaned normally. None of the 117 occupants aboard the airplane were injured. The regularly scheduled passenger flight was operating under the provisions of Title 14 Code of Federal Regulations Part 121 from the McCarran International Airport (LAS), Las Vegas, Nevada to SMF.

Pilot Information

Certificate:	Airline transport	**Age:**	42,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	December 10, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 21, 2019
Flight Time:	9400 hours (Total, all aircraft), 7045 hours (Total, this make and model)		

Co-pilot Information

Certificate:	Airline transport	**Age:**	32,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	May 15, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	April 29, 2019
Flight Time:	4030 hours (Total, all aircraft), 1455 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Airbus	**Registration:**	N521NK
Model/Series:	A319 132	**Aircraft Category:**	Airplane
Year of Manufacture:	2006	**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	2797
Landing Gear Type:	Retractable - Tricycle	**Seats:**	152
Date/Type of Last Inspection:	Continuous airworthiness	**Certified Max Gross Wt.:**	166449 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:	44894 Hrs at time of accident	**Engine Manufacturer:**	Pratt and Whitney
ELT:	Installed, not activated	**Engine Model/Series:**	V2524-A5
Registered Owner:	Spirit Airlines Inc	**Rated Power:**	
Operator:	Spirit Airlines Inc	**Operating Certificate(s) Held:**	Flag carrier (121)

The Airbus A319, in common with other Airbus aircraft, is equipped with an electronic instrument system (EIS). This system consists of six liquid crystal cockpit display units (DU), two displays in front of each pilot and two central displays. The upper display is the Engine and Warning Display (E/WD), the lower display is the Systems display. The pilot displays are part of the electronic flight instrument system (EFIS) and provide primary flight instrumentation information on the primary flight display (PFD) and the navigation display (ND). The PFDs present information on aircraft attitude, performance, flight path and autopilot modes and the NDs provide navigation, weather radar and Traffic alert and Collision Avoidance System (TCAS) information.

The System Display (SD) has the capability to display 13 different system pages, the cruise page or the status page. The display has two areas: the upper section of the screen provides information based on the selection of the display, and the lower section contains permanent data that is always present regardless of the page selection. This permanent data contains information on the total and static outside air temperatures, the time, the aircraft's gross weight and its center of gravity. In flight, the 'default' cruise page is generally displayed. This page shows additional engine parameters, such as fuel burn, oil quantity and vibration levels, as well as cabin air and pressurization parameters.

The lower ECAM display unit normally provides the "System Display", which presents synoptic diagrams showing the status of various aircraft systems. The ECAM display is controlled through the ECAM Control Panel (ECP), located on the center pedestal directly below the ECAM displays.

A specific system page such as the "ELEC System" may be called up manually, by selection of the appropriate button on ECP; a page will appear automatically following an aircraft system failure.

For both the synoptic diagrams and the control panel captions, normal system conditions are displayed in green or white and abnormal conditions in amber. A number of fault conditions also cause the red Master Warning or amber Master Caution caption lights on the flight deck to illuminate and a continuous or single chime to sound.

The electrical power system (EPS) on this aircraft consists of a three-phase 115/200 V 400 Hz constant-frequency AC system and a 28 V DC system. The EPS comprises two electrical networks, a left and a right, denoted AC BUS 1 and AC BUS 2. There is also a third network, called the "AC Essential" Bus, which is supplied by either AC BUS 1 or AC BUS 2; this BUS supplies power to most of the critical aircraft systems.

AC BUS 1 and AC BUS 2 networks are normally independent of one another, so that the failure of one network should not affect the operation of the other. The power supplies for flight critical systems are for the most part segregated, so that the loss of a single power source should not cause concurrent failures of systems necessary for continued safe flight.

Two engine-driven AC generators (GEN 1 & GEN 2), one mounted on each engine, normally power the EPS system. Each generator is driven from the engine high-pressure spool via an engine accessory gearbox and an integrated hydro-mechanical speed regulator. The regulator transforms variable engine rotational speed into a constant-speed drive for the generator. The constant-speed drive and the generator together form an assembly known as an Integrated Drive Generator (IDG). According to Spirit Airlines records, the Number 1 IDG (IDG1) was installed on the aircraft on November 12, 2017, in Philadelphia, PA. It had been installed for approximately 827 days and accumulated 8,582 hours and 3,693 cycles prior to its removal. The Number 2 IDG (IDG2) was installed on the incident aircraft on March 29, 2017, in Orlando, FL. It had been installed for approximately 1,055 days and accumulated 10,584 hours and 4,581 cycles prior to its removal.

The output frequency and voltage of each IDG is controlled by its respective generator control units (GCU); the Number 1 GCU controls the IDG1 and the Number 2 GCU controls the IDG2. The GCUs also protect the network by controlling the associated generator line contactor (GLC).

The EPS also comprises a third generator (APU GEN) that is driven directly by the Auxiliary Power Unit; it produces the same electrical output as each of the main engine generators. Additionally, a ground power connector near the nosewheel allows ground power to be supplied to all busbars. A Ground and Auxiliary Power Control Unit (GAPCU) regulates the frequency and voltage of the APU generator; it also protects the network by controlling the external power contactor and the APU generator line contactor.

In the event there is a loss of both the AC BUS 1 and AC BUS 2 busbars in flight, vital aircraft electrical services can be supplied by an Emergency Generator which is driven by the ram air turbine (RAT). The RAT deploys either automatically, usually because of loss of both main AC busbars, or on manual selection. RAT deployment is indicated by a green icon on the ECAM hydraulic system page.

The electrical system is controlled via the electrical panel located on the overhead console in the cockpit. This panel provides for annunciation of the status of the electrical system and fault conditions. The generator control switches are identified as GEN 1, GEN 2 and APU GEN for the left, right and APU generators. If a fault occurs with a generator, an amber fault message will illuminate on the respective generator control push button (PB) switch indicating the channel is offline. For a generator fault, pressing the PB once turns the generator to OFF. Pressing the PB a second time is required to reset the generator back to ON.

A review of maintenance records found that N521NK had experienced a loss of power supplied from IDG1 and IDG2 prior to the February 15th, 2020, flight to SMF. The following paragraphs describe the four previous events. According to Airbus, the introduction section of their troubleshooting manual (TSM) indicates that if the operator cannot find a fault symptom and/or fault isolation procedure necessary to ensure the continued airworthiness of the aircraft, or if the operator thinks that the information given is not complete, they should contact Airbus.

On January 19, 2020, N521NK, operating as Spirit Airlines Flight NK1848, experienced a loss of all electrical power and the loss of nose wheel steering about 3 minutes after shutting down the Number 1 engine while taxing after landing at the Orlando International Airport (MCO), Orlando, Florida. Spirit Airlines Maintenance performed a run-up of the Number 1 engine per the procedures contained in aircraft maintenance manual (AMM) 71-00-00. The full electrical load was supported by IDG1, and no faults were noted. The aircraft was determined to be ok for continued service and no additional troubleshooting was accomplished. According to Airbus, they were not contacted regarding this event.

On January 23, 2020, N521NK, operating as Spirit Airlines Flight NK1445, experienced a loss of IDG1, nose wheel steering and all electrical power during a single engine taxi after landing at MCO. The flight crew observed the 'ELEC GEN 1 FAULT' message on the lower ECAM display. Spirit Airlines Maintenance performed an operational test of IDG1 per AMM 24-22-00. No faults were noted. According to Airbus, Using the Airbus AirnavX Troubleshooting tool, TSM task 24-00, "GEN 1 FAULT Warning" could have been used. This task requires the operator to perform an engine run and verify the GEN1 parameters. If the fault is confirmed (i.e. GEN1 parameters are not correct), then the troubleshooting data (TSD) from the GCUs shall be extracted. If the fault cannot be confirmed, Airbus can be contacted.

According to the NVM download from GCU Number 1, N521NK experienced a loss of IDG1 while performing a single engine taxi after landing on January 29, 2020. No maintenance information was available from Spirit regarding this event.

On February 14, 2020, N521NK, operating as Spirit Airlines Flight NK806, experienced a loss of all electronics (dual generator failure) while on approach to the Hartsfield-Jackson Atlanta airport (KALT), Atlanta, Georgia. Spirit Airlines Maintenance performed a check of the oil levels on the Number 1 and 2 engine IDG and found the levels good per aircraft maintenance manual (AMM) 12-13-24. Maintenance also ran both engines per AMM 71-00-00 and found that they both checked good. The aircraft was determined to be ok for continued service. According to Airbus, the Airbus AirnavX Troubleshooting tool, TSM task 24-21-51, "IDG1" and "IDG2" could have been used. These TSM procedures require checking the wiring of the IDG servo-valve, and then changing the GCU if the wiring is correct, and ultimately replacing the IDG if the fault continues.

Collins Aerospace performed a download of the non-volatile memory (NVM) from the Number 1 and Number 2 GCU's and the GAPCU at their facility located in Rockford Illinois. The data revealed that during the February 14 and 15th flights in which there was a dual loss of electrical power, both GCU's recorded fault code 145. According to Collins, GCU's provide electrical system monitoring and protection and will automatically turn off their respective electric power generating channel when design parameters are exceeded. Each IDG contains an electro-mechanical servo valve which plays a role in frequency control. GCU's monitor servo valve frequency modulation and if it detects that the frequency is outside of specified design limits, it will trigger fault code 145. This fault is designed to stop system operation in the case of a failing servo valve. For the February 14th and 15th flights, the Number 2 GCU tripped at a normal load as fault 145 and the Number 1 GCU tripped as fault 145 after the electrical load was doubled due to the Number 2 generator dropping off-line.

The NVM data also revealed that the Number 1 GCU recorded fault code 145 on January 19, 23, and 29th 2020. For these events, Collins noted that fault code 145 occurred after the airplane had landed and was performing a single-engine taxi. In this configuration, the Number 1 IDG is supplying all of the aircraft electrical load.

Collins Aerospace also performed examination and testing of the Number 1 & 2 IDG's removed from the incident airplane. Testing found that both IDGs failed their frequency control tests. The frequency test data for IDG1 showed a frequency modulation that would have triggered fault 145 on its GCU. IDG2 showed similar frequency issues. However, despite extensive testing by Collins and Airbus with varied electrical load and acceleration/decelerations profiles, it was not found that IDG2 produced the exact frequency modulation to specifically trigger fault 145. It was noted that the test setup was not identical to the on-aircraft situation.

Upon disassembly of IDG1, it was observed that the fixed hydraulic cylinder blocks had been modified by a non-OEM process and were marked as PN CB-31773. Visual inspection of the fixed blocks revealed that portions of the Number 3 and 5 bronze bore lining were missing, having flaked off after wearing thin. There was approximately 1/4 to 1/3 of the bore missing in the Number 3 and Number 5. Several "flecks" of metal, copper in color were noted in the block assembly.

The incident fixed cylinder block and its pistons from IDG1 were replaced by a new set for the purpose of re-testing the frequency behavior of the IDG. During the re-test, it was observed that the IDG produced the proper frequency performance and also fully passed the Acceptance Test Procedure (ATP).

The teardown of IDG2 was generally unremarkable. Like IDG1, the fixed cylinder block had been modified by the same FAA-approved minor repair and marked as PN CB-31773. The fixed-block showed severe wear in several bores. Again, visual inspection revealed that portions of the bronze bore lining were missing, having flaked off after wearing thin. Because the "SV MODULATION," fault 145 indicates a fault with the servo valve, it was removed from IDG2 for isolated testing. The servo valve passed all tests and no faults were found.

After replacing only the damaged fixed-block/pistons, IDG2 passed ATP. All frequency performance anomalies noted before the repair were remedied by replacing the fixed block.

For thoroughness, both IDGs were disassembled completely in order to inspect for any additional contributing factors. None were found.

During the teardown of IDG1, to confirm the non-contribution of the servo valve, it also was removed for isolated testing, which it passed.

The fixed cylinder blocks and mating piston assemblies from each IDG were submitted to the NTSB Materials Laboratory for examination. The fixed cylinder blocks were identified as part number 764635; the cylinder block removed from the left engine, S/N 1266, was vibro-peen marked with S/N Y10-245-19 and the cylinder block removed from the right engine, S/N 1157, was vibro-peen marked with S/N Y04-232-49. As previously noted, both fixed cylinder blocks were also vibro-peen marked with 'CB-31773', which was reported as the process number for rework performed on the cylinder block bore linings by an aftermarket company. The part numbers and serial numbers listed above were assigned by the original equipment manufacturer (OEM) of the fixed cylinder blocks.

The fixed cylinder block S/N Y10-245-19 (left engine) and associated pistons were visually examined and photo documented. Bands of circumferential wear marks were visible on the outer diameter (OD) of the pistons. A few pistons had heavier bands of wear than others, and the bands occurred along most of the length of the pistons. Wear was observed in the gold-colored liners assembled inside the bores of the fixed cylinder block. The wear was uneven around the circumference and occurred close to either end of the bores, with the heaviest wear extending up from the bottom of the bores. The gold-colored liners were worn through in some areas in several bores, and silver-colored base metal was visible. Areas on bores 3, 5, and 6 were missing segments of gold-colored liner; the areas with missing liner ranged in size from very small to almost half the liner length. In areas where the gold-colored liner was beginning to wear through, thin circumferential rings became visible. In areas where the gold-colored liner was missing, thicker circumferential rings consistent with machining were visible. A piece of gold-colored debris was present in the bottom of at least one of the bores. For additional information, reference the Materials laboratory factual report for this incident.

The fixed cylinder block Y04-232-49 (right engine) and associated pistons were visually examined and photo documented. Only bore 3 had the gold-colored liner worn through. The heavily worn bore 3 and another bore with a lesser amount of wear (bore 7) were destructively examined. The bottom 0.1 inches of the sectioned piece of liner was missing, and the edge of the liner adjacent to the missing portion had thinned. The ID surface of the block piece and OD surface of the liner had a substance on it consistent with the bores examined from the other fixed block. The substance along the bottom half of the liner OD had darkened in color, along with several areas on the ID of the block piece. Debris was visible adhering to the substance inside some of the machined grooves in the ID of the block. For additional information, reference the Materials laboratory factual report for this incident.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	
Precipitation and Obscuration:			
Departure Point:	Las Vegas, NV (KLAS)	**Type of Flight Plan Filed:**	IFR
Destination:	Sacramento, CA (SMF)	**Type of Clearance:**	IFR
Departure Time:	06:30 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	Sacramento International Airport SMF	**Runway Surface Type:**	Concrete
Airport Elevation:	26 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	34L	**IFR Approach:**	ILS;Visual
Runway Length/Width:	8598 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	5 None	**Aircraft Damage:**	None
Passenger Injuries:	112 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	117 None	**Latitude, Longitude:**	38.695556,-121.59083(est)

Flight recorders

The flight data recorder was a Honeywell 4700 solid-state flight data recorder (SSFDR) that records airplane flight information in a digital format using solid-state flash memory as the recording medium. The FDR was examined upon receipt, was found to be in good condition and the data were extracted normally from the recorder. The FDR recording contained approximately 27 hours of data. Two flight segments on the recording were of interest to the investigation: the last flight (Flight 1818) and flight NK806 which occurred two segments before the last flight on the recording. An uneventful flight, flight number NK805, was performed between the two legs of interest.

The cockpit voice recorder (CVR) was a Honeywell 6022 solid-state CVR that records at minimum two hours of digital audio from four input channels – one channel for each crew member (captain, first officer, and observer) and one channel for the cockpit area microphone (CAM). The four channels are processed to create five distinct audio files: one 30-minute file for each channel, one 2-hour file for the CAM, and one 2-hour file of channels 1, 2, and 3 combined.

Upon arrival at the laboratory, it was evident that the CVR had not sustained any heat or structural damage, and the audio information was extracted from the recorder normally, without difficulty.

The recording began with a crew discussing non-pertinent events in cruise and ended after the aircraft had landed and parked at a gate at KLAS. It was determined that the recording was not of the event flight (NK1818), but rather the flight prior to the event flight (NK805). Further, it was determined that the aircraft had a similar inflight dual generator failure the previous day on flight NK806, which was two flight legs prior to the event leg.

The operator was notified that the CVR did not contain audio from the incident flight. The operator stated that a request was made from their maintenance and engineering department to pull the CVR circuit breaker on the aircraft after the dual generator failure on flight NK806 to preserve the recording from that flight. However, the request to pull the circuit breaker in KATL did not reach the appropriate maintenance personnel before the aircraft departed for KLAS. The CVR circuit breaker was then pulled after the aircraft arrived in KLAS. As a result, the CVR audio preserved was from the flight KATL to KLAS resulting in the CVR not being powered during the incident flight.

Organizational and Management Information

Several improvement actions were taken by Airbus to reduce the likelihood of additional events in which there is a loss of all electronics resulting from a dual generator failure.

Airbus has improved their A318/A319/A320/A321 trouble shooting manual (TSM) by incorporating steps to direct maintenance towards a direct extraction of the post flight report (PFR) and troubleshooting data (TSD) from the GCUs.

Airbus is also reviewing the possibility of introducing new recurrent maintenance tasks in their maintenance planning document (MPD) to ensure the IDG's are operational. The objective would be to detect a degraded IDGs/APU GEN and to replace them before they fail in service.

Administrative Information

Investigator In Charge (IIC):	Hauf, Michael
Additional Participating Persons:	Will Webber; Collins Aerospace; Rockford, IL Byron A. Silkett-Irvine; Spirit Airlines Matt T. Gorshe; ALPA Patrick D. Lusch; FAA; DC Vincent ECALLE; BEA Stéphane COTE; Airbus Accident/Incident Investigation
Original Publish Date:	September 30, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this incident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=100967