



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Savannah, GA	<b>Accident Number:</b>	ERA14LA098
<b>Date &amp; Time:</b>	01/14/2014, 1447 EST	<b>Registration:</b>	N720QS
<b>Aircraft:</b>	ISRAEL AIRCRAFT INDUSTRIES GULFSTREAM 200	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Part(s) separation from AC	<b>Injuries:</b>	2 None
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Flight Test		

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## Analysis

The airplane had undergone maintenance for an unresolved landing gear position indication issue. The flight crew reported that, during the third postmaintenance operational check flight (OCF), the airplane experienced a “thud” and momentary shudder as it climbed through 16,000 ft at 280 knots. The flight crew observed no other anomalies and did not experience any abnormal handling characteristics with the airplane during the remainder of the flight.

Upon landing, the flight crew observed that the auxiliary power unit (APU) service door was open and bent but that it remained attached at its aft hinge point. The door’s lower latches were partially engaged, and a detailed examination revealed no anomalies with the latch assembly. The lower portion of the rudder was substantially damaged due to contact with the service door. Review of maintenance work orders revealed that maintenance had been performed in the APU compartment before another OCF that had been conducted several days before the accident flight and that it was subsequently inspected in accordance with the maintenance provider’s procedures. Maintenance personnel should have noted that the APU service door was not properly secured during the inspection. The flight crew’s preflight inspection did not include inspecting the APU service door because it was only accessible with the aid of a ladder.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Maintenance personnel’s failure to properly secure the auxiliary power unit service door before returning the airplane to service, which resulted in substantial damage to the rudder.

## Findings

<b>Aircraft</b>	Return to service - Incorrect service/maintenance (Cause) Maintenance/inspections - Inadequate inspection (Cause)
<b>Personnel issues</b>	Post maintenance inspection - Maintenance personnel (Cause)

## Factual Information

On January 14, 2014, approximately 1447 eastern standard time, an Israel Aircraft Industries Gulfstream 200, N720QS, operated by NetJets Aviation, Inc., was substantially damaged when the auxiliary power unit (APU) service door opened in-flight near Savannah, Georgia. Both airline transport pilots were not injured. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the local flight, which departed Savannah/Hilton Head International Airport (SAV) at 1436. The post-maintenance operational check flight (OCF) was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

The airplane had been undergoing general maintenance, as well as maintenance for a recurring landing gear position indication issue. The airplane was returned to service on January 9, 2014, and during the subsequent OCF, the crew discovered that the landing gear position indication issue had not been resolved. Additional maintenance was performed, and during the return-to-service inspection on January 10, a large quantity of fuel was noted in the APU compartment due to a leak in a fuel line fitting to the APU fuel control unit. An o-ring was removed and replaced at the location of the leak, and a subsequent leak test revealed no anomalies. The airplane was returned to service, and a second OCF revealed that the landing gear indication issue remained unresolved. The airplane underwent further maintenance from January 10 to January 14, and was returned to service on January 14.

Prior to departure on the accident flight, the crew performed a preflight inspection and observed no anomalies. They described the takeoff as normal, and stated that as the airplane climbed through 16,000 feet at 280 knots, they experienced a "thud" and momentary shudder. No other anomalies were observed, and the crew did not experience any abnormal handling characteristics with the airplane. Upon landing at SAV, the crew observed that the APU service door was open and bent, but remained attached at its aft hinge point. The door's lower latches were in the down and locked position, and the side latches were in the open position. The crew noted that the side latches were "bent as if torn away." The lower portion of the rudder exhibited substantial damage due to contact with the door. According to the operator, the crew's preflight inspection included only a visual confirmation of the security of the service door, because due to its location on the airplane, the door could only be accessed with the aid of a ladder.

Review of work orders indicated that prior to each OCF on January 9 and 10, the airplane received a full post-maintenance inspection, which included verifying aft fuselage accesses, antennas, and vents for leakage, condition, and security. Prior to the accident flight, the airplane underwent an inspection only to the areas that had received maintenance since the previous OCF. Between the OCF on January 10 and the accident flight on January 14, the APU door was not accessed and no maintenance was performed in the area of the APU.

According to the airframe manufacturer, between 2005 and 2014, there were 5 other reports of in-flight APU service door events involving G200 airplanes, resulting in minor damage. In October 2008, the manufacturer issued a maintenance and operations letter (G200-MOL-08-0009) to remind flight crews to inspect all service and access doors for security prior to flight. On February 21, 2014, the manufacturer issued Maintenance and Operations Letter G200-MOL-14-0002, advising maintenance and operations personnel to verify that the APU service door was properly seated and latched when being secured.

Review of the previous in-flight APU service door events by the manufacturer revealed that, during manufacturing, the forward APU service door latches may have been trimmed to prevent interference with the frame, possibly resulting in insufficient overlap between the latches and the doubler. On May 30, 2014, the airframe manufacturer issued Service Bulletins 200-52-403 and 280-52-136, calling for inspection of the forward APU service door latches on G200 and G280 airplanes, respectively. Examination of the latches on the accident airplane immediately following the accident revealed the proper overlap between the latches and doubler.

## History of Flight

Enroute-climb to cruise	Part(s) separation from AC (Defining event)
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## Pilot Information

Certificate:	Airline Transport	Age:	45
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Without Waivers/Limitations	Last Medical Exam:	08/21/2013
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	08/02/2013
Flight Time:	(Estimated) 2997 hours (Total, all aircraft), 2997 hours (Total, this make and model)		

## Co-Pilot Information

Certificate:	Airline Transport	Age:	60
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 1 With Waivers/Limitations	Last Medical Exam:	11/11/2013
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	10/21/2013
Flight Time:	(Estimated) 2583 hours (Total, all aircraft), 2583 hours (Total, this make and model)		

## Aircraft and Owner/Operator Information

Aircraft Manufacturer:	ISRAEL AIRCRAFT INDUSTRIES	Registration:	N720QS
Model/Series:	GULFSTREAM 200 NO SERIES	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	085
Landing Gear Type:	Retractable - Tricycle	Seats:	11
Date/Type of Last Inspection:	12/19/2013, AAIP	Certified Max Gross Wt.:	35650 lbs
Time Since Last Inspection:		Engines:	2 Turbo Fan
Airframe Total Time:	7493 Hours	Engine Manufacturer:	P&W CANADA
ELT:	C126 installed, not activated	Engine Model/Series:	PW306A
Registered Owner:	NETJETS SALES INC	Rated Power:	6040 lbs
Operator:	NetJets Aviation, Inc	Air Carrier Operating Certificate:	Fractional Ownership
Operator Does Business As:		Operator Designator Code:	DTXA

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	SAV, 50 ft msl	Observation Time:	1453 EST
Distance from Accident Site:		Direction from Accident Site:	
Lowest Cloud Condition:	Scattered / 2800 ft agl	Temperature/Dew Point:	29° C / 9° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	14 knots, 300°	Visibility (RVR):	
Altimeter Setting:	29.91 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Savannah, GA (KSAV)	Type of Flight Plan Filed:	IFR
Destination:	Savannah, GA (KSAV)	Type of Clearance:	IFR
Departure Time:	1436 EST	Type of Airspace:	

## Airport Information

Airport:	Savannah/Hilton Head Intl (KSAV)	Runway Surface Type:	N/A
Airport Elevation:	50 ft	Runway Surface Condition:	Unknown
Runway Used:	N/A	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 None	<b>Latitude, Longitude:</b>	32.127500, -81.202222 (est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Allison N Diaz	<b>Adopted Date:</b>	04/27/2015
<b>Additional Participating Persons:</b>	Michael A Pupek; FAA/FSDO; Atlanta, GA Paul McClaskey; NetJets Aviation; Columbus, OH Kimberly Lascell; Gulfstream Aerospace Corporation; Savannah, GA		
<b>Publish Date:</b>	04/27/2015		
<b>Investigation Docket:</b>	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=88694">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=88694</a>		

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