



# National Transportation Safety Board Aviation Incident Final Report

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<b>Location:</b>	Auburn, AL	<b>Incident Number:</b>	ATL04IA073
<b>Date &amp; Time:</b>	02/03/2004, 1400 CST	<b>Registration:</b>	N125AR
<b>Aircraft:</b>	Cessna 208B	<b>Aircraft Damage:</b>	None
<b>Defining Event:</b>		<b>Injuries:</b>	2 None

**Flight Conducted Under:** Part 91: General Aviation - Positioning

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## Analysis

According to the flight crew, during the takeoff roll the co-pilot noticed that the right rudder and trim controls were not responding. During the flight they began to diagnose the problem. The pilot continued the flight and made an uneventful landing. During the post-landing examination of the airplane, the right rudder cable was found broken. Examination of the rudder cable by the NTSB Materials Laboratory found that the wire rope portion of the cable was fractured just inside the clevis fitting at the forward end of the cable. The fracture of the wire rope portion on the control cable assembly was the result of fatigue cracking that initiated because of the introduction of bending loads due to the over-torque of the clevis bolt during the manufacturing process.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: The fatigue fracture of the wire rope portion on the rudder control cable assembly due to improper installation and inadequate procedures by the aircraft manufacturer.

## Findings

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Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION  
Phase of Operation: CRUISE - NORMAL

### Findings

1. (C) FLT CONTROL SYST, RUDDER CONTROL CABLE/ROD - OVERTORQUE
2. FLT CONTROL SYST, RUDDER CONTROL CABLE/ROD - FRACTURED
3. (C) MAINTENANCE, INSTALLATION - IMPROPER - MANUFACTURER
4. (C) PROCEDURE INADEQUATE - MANUFACTURER

## Factual Information

On February 3, 2004, at 1400 central standard time, a Cessna 208B, N125AR, registered to and operated by Rushton Air, lost right rudder control shortly after takeoff from the Columbus Metro Airport in Columbus, Georgia. The repositioning flight was operated under the provisions of Title 14 CFR Part 91, and visual flight rules. Visual meteorological conditions prevailed and no flight plan was filed. The pilot and co-pilot were not injured, and the airplane was not damaged. The flight departed the Columbus Metro Airport, in Columbus, Georgia on February 3, 2004 at 1340, enroute to Auburn-Opelika Airport in Auburn, Alabama.

According to the flight crew, during the takeoff roll the co-pilot noticed that the right rudder was not responding. Due to the high traffic volume at Columbus, Georgia they elected to proceed to the Auburn-Opelika Airport in Auburn, Alabama. During the flight they began to diagnose the problem. They found that the rudder trim was not responding and full deflection of the right rudder pedal did not have any effect. Further examination found the right rudder cable broken. The crew contacted their Chief Pilot and Director of Maintenance, and found out that there was nothing that could be done in-flight. The pilot asked that emergency vehicles meet them on runway 36 just as a precaution. The pilot did not declare an emergency. The airplane landed uneventfully on runway 36 and the pilot performed a normal shutdown.

Examination of the rudder cable found it separated at the trailing end of its attaching clevis. The cable and clevis were sent to the NTSB Materials Laboratory in Washington, DC for further examination.

Examination of the rudder cable by the NTSB Materials Laboratory found that the wire rope portion of the cable was fractured just inside the clevis fitting at the forward end of the cable. The strands of the wire rope had separated from each other over a distance of more than 1 foot from the cable end. The individual wires in most of the strands had not separated from each other or were separated over a much shorter distance. Visual examination of the fractured wire ends with the aid of a bench binocular microscope revealed that the wire fractures were aligned with each other within about 0.02 inch, and were located about 0.05 inch inside the end of the clevis fitting. Nearly all of the fractures were on a flat transverse plane, with no apparent necking down deformation, features typical of fatigue cracking. A few of the wires were fractured on a slant plane and did contain necking down deformation, features typical of overstress fracture; and a few of the wires had fractures with a mixture of fatigue and overstress features. Further examination of the clevis fitting revealed that the forward ends of the clevis tines were pinched together. The spacing between the tines was measured with calipers and found to be 0.18 inch near where the tines joined together and 0.13 inch near the tip. Visual examination of the inside surfaces of the tines of the clevis fitting revealed the presence of a dark rust-colored discoloration, typical of fretting or rubbing damage, adjacent to the tip of the tines. The exterior surface of the clevis fitting also contained imprint or rubbing marks from contact with the underside of the attachment bolt head and from the washer under the nut. On both sides of the clevis, the damage was found dominantly on the forward and aft of the attachment bolt hole (and much less on the upper and lower sides of the hole). The damage on this side was much more severe than on the other side.

According to Cessna Aircraft Company, as a result of this failure, Cessna is adding a spacer to the production process that will be placed between the rudder cable clevis and the rod end. This change will also be reflected in the Cessna Illustrated Parts Catalog.

## Pilot Information

<b>Certificate:</b>	Flight Instructor; Commercial	<b>Age:</b>	28, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane Single-engine	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 Valid Medical--no waivers/lim.	<b>Last FAA Medical Exam:</b>	02/07/2003
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	01/16/2004
<b>Flight Time:</b>	3000 hours (Total, all aircraft), 2000 hours (Total, this make and model), 2500 hours (Pilot In Command, all aircraft), 150 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

## Co-Pilot Information

<b>Certificate:</b>	Flight Instructor; Commercial	<b>Age:</b>	28, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Valid Medical--w/ waivers/lim.	<b>Last FAA Medical Exam:</b>	10/13/2003
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	10/01/2003
<b>Flight Time:</b>	1300 hours (Total, all aircraft), 130 hours (Total, this make and model), 950 hours (Pilot In Command, all aircraft), 150 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N125AR
Model/Series:	208B	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal; Transport	Serial Number:	2080925
Landing Gear Type:	Tricycle	Seats:	11
Date/Type of Last Inspection:	01/12/2003, AAIP	Certified Max Gross Wt.:	9000 lbs
Time Since Last Inspection:	50 Hours	Engines:	1 Turbo Prop
Airframe Total Time:	1547 Hours at time of accident	Engine Manufacturer:	Pratt & Whitney
ELT:	Installed, not activated	Engine Model/Series:	PT6-114A
Registered Owner:	Rushton Air	Rated Power:	675 hp
Operator:	Rushton Air	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:		Operator Designator Code:	YRAA

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	AUO, 640 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	1350 CDT	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	9 knots / 12 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	280°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.18 inches Hg	Temperature/Dew Point:	15° C / -1° C
Precipitation and Obscuration:			
Departure Point:	Columbus, GA (CSG)	Type of Flight Plan Filed:	None
Destination:	Auburn, AL (AUO)	Type of Clearance:	None
Departure Time:	1340 CST	Type of Airspace:	Class D

## Airport Information

Airport:	Auburn - Opelika (AUO)	Runway Surface Type:	Asphalt
Airport Elevation:	640 ft	Runway Surface Condition:	Dry
Runway Used:	36	IFR Approach:	None
Runway Length/Width:	5000 ft / 100 ft	VFR Approach/Landing:	Traffic Pattern

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 None	<b>Aircraft Damage:</b>	None
<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>	32.616667, -85.433333

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Butch Wilson	<b>Report Date:</b>	06/08/2005
<b>Additional Participating Persons:</b>	Ricky Messer; Birmingham FSDO		
<b>Publish Date:</b>			
<b>Investigation Docket:</b>	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.ntsbt.gov/pubdms/">http://dms.ntsbt.gov/pubdms/</a> .		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).