



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Toksook Bay, AK	<b>Accident Number:</b>	ANC09LA009
<b>Date &amp; Time:</b>	11/01/2008, 1902 AKD	<b>Registration:</b>	N437RA
<b>Aircraft:</b>	CONSTRUCCIONES AERONAUTICAS SA CASA-212	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Powerplant sys/comp malf/fail	<b>Injuries:</b>	2 Minor
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Non-scheduled		

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## Analysis

According to the captain, as the first officer turned the twin-engine turboprop airplane from base leg to final, she advanced the engine power levers to increase engine power, but the right engine did not respond and the airplane yawed to the right. About 500 feet above the ground, the captain said that he took control and initiated a go-around by adding full engine power. As power was increased, the yaw intensified, and the captain said he was unable to maintain altitude. As he called for the first officer to feather the right engine, the stall warning horn sounded and he had to use both hands to maintain control of the airplane. The airplane continued to descend, struck the tundra-covered terrain, and sustained substantial damage to the fuselage, wings, and empennage. The right engine propeller was not feathered at impact. A postaccident inspection revealed that the linkage connecting the cockpit-mounted engine power lever to the right engine propeller pitch control (PPC) was disconnected, and the bolt connecting the linkage to the PPC was missing. Company management reported that the right engine had been changed 237.2 flight hours before the accident, which required the removal and reinstallation of the PPC linkage. Additionally, the airplane had undergone a scheduled maintenance inspection event following the engine change, 114.3 hours before the accident, requiring a functional test of the torque on the bolt that attaches the linkage. The inspection is part of the operator's approved airworthiness inspection program. Once the PPC linkage disconnected, the flight crew was unable to control the right engine's thrust, making it difficult for them to maintain control of the airplane during the approach. Since the bolt that connects the PPC linkage to the splined shaft was not found, it is unknown if the bolt failed or if maintenance personnel failed to properly tighten/torque the bolt at installation.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The flight crew's inability to adjust/increase power to the right engine during the landing approach due to an in-flight disconnect of the engine power control linkage, resulting in a loss of control of the airplane. Contributing to the accident was the flight crew's delayed response in feathering the right engine propeller.

## Findings

<b>Aircraft</b>	Power lever - Failure (Cause) Performance/control parameters - Attain/maintain not possible (Cause) Propeller feather/reversing - Not specified (Factor)
<b>Personnel issues</b>	Delayed action - Flight crew (Factor)

## Factual Information

On November 1, 2008, about 1902 Alaska daylight time, a twin-engine Construcciones Aeronauticas SA (Casa) 212 turboprop airplane, N437RA, collided with tundra-covered terrain during a forced landing, about 1 mile north-northeast of Toksook Bay, Alaska. The airplane sustained substantial damage. The airplane was being operated as a visual flight rules (VFR) cargo flight under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135. The airplane was owned and operated by Arctic Transportation Services (ATS), Inc., Anchorage, Alaska. The two crew members, the airline transport captain, and the commercial first officer, sustained minor injuries. Visual meteorological conditions (VMC) were reported in the area at the time of the accident, and company flight following procedures were in effect. The flight originated at the Bethel Airport, Bethel, Alaska, about 1822, and was en route to Toksook Bay, and Tununak, Alaska, before returning to Bethel.

During a telephone conversation with the National Transportation Safety Board investigator-in-charge (IIC) on November 2, the captain reported that the trip to Toksook Bay was flown by the first officer. He said that when the flight initially departed Bethel, instrument meteorological conditions (IMC) prevailed, and an instrument flight rules (IFR) flight plan was filed. He noted that just after departure from Bethel, weather conditions improved significantly, and they canceled the IFR clearance. The flight continued to Toksook Bay in VFR conditions.

The captain noted that as they approached Toksook Bay from the northeast, he instructed the first officer to land on Runway 16. He said that during the landing approach, as the first officer maneuvered the airplane from base leg to final, she advanced the engine power levers to shallow the airplane's approach path, but there was no response from the right engine. He said that as the airplane began to yaw to the right, he took control of the airplane, initiated a go-around, and added full engine power in an attempt to climb away from rising terrain. About 500 to 600 feet above the ground, the airplane's yaw to the right intensified, and it began to descend rapidly. He said he applied full left aileron and rudder to correct the yaw, but he was unable to maintain altitude. He observed that the left engine torque meter was indicating 100 percent engine torque, and the right engine torque meter was indicating between 0 and 10 percent engine torque. The captain noted in his written report to the NTSB, in part: "As I was calling for [propeller] feather, the stall warning horn sounded, the stall warning light illuminated, and I used both hands to pitch the aircraft forward to avoid a stall." He selected an area of tundra-covered terrain as a forced landing site. The airplane struck the ground with the right main landing gear, and right front portion of the fuselage. The airplane sustained substantial damage to the fuselage, wings, and empennage.

The airplane was powered by two Honeywell TPE331 series turbo shaft engines, equipped with a Negative-Torque-Sensing (NTS) system, which provides automatic drag reduction in the event of an engine failure. The function of the NTS system is to limit the amount of negative torque that a windmilling propeller produces by automatically cycling the propeller blades towards feather. According to a technical representative from Honeywell Aerospace, the NTS system is not an automatic propeller feathering system. To feather the propeller after an engine failure, the crew must move the appropriate cockpit lever to the FEATHER position. The captain said that right engine NTS system did not reduce the drag during the approach, and that he was unable to increase power to the right engine.

The airplane was not equipped with a Cockpit Voice Recorder (CVR) or Flight Data Recorder (FDR), nor was it required to be.

At 1856, an Aviation Routine Weather Report (METAR) from Toksook Bay was reporting, in part: Wind, 230 degrees at 6 knots; visibility, 6 miles with light mist; clouds and sky condition, 5,500 feet broken; temperature, 34 degrees F; dew point, 30 degrees F; altimeter, 29.75 inHg.

## TESTS AND RESEARCH

On November 4, a Federal Aviation Administration (FAA) airworthiness inspector, Anchorage Flight Standards District Office, along with a technical representative from Honeywell Aerospace, examined the airplane at the accident scene. The FAA inspector reported that during their examination of the airplane's wreckage, it was discovered that the mechanical linkage, which connects the cockpit-mounted engine power lever to the right engine propeller pitch control (PPC), was found disconnected. He said that the bolt which connects the linkage to the PPC was missing. He added that the fuel control unit setting remained in the "flight-idle" position once the mechanical PPC linkage became disconnected.

The mechanical linkage lever is attached to PPC by means of a serrated fitting that is machined into the base of the lever, which then fits over a splined shaft on the PPC. The mechanical linkage lever is held onto the splined shaft of the PPC by tightening a bolt that clamps the linkage to the splined shaft.

### Engine Maintenance and Inspection Information

At the time of the accident, the airplane had accumulated 26,005.9 flight hours. The left engine had accrued 20,470.0 flight hours, and 1,103.0 flight hours since overhaul. The right engine had accrued 3,410.4 flight hours since new.

According to the operator's director of maintenance, the right engine was a leased engine used while their engine was being repaired. A review of the operator's maintenance logs revealed that the right engine was installed on the accident airplane on August 26, 2008, 237.2 flight hours before the accident. The director of maintenance noted that the PPC mechanical linkage is removed when the engine is removed then reinstalled once the new engine is installed.

### Operator Maintenance Program

The airplane was maintained on an FAA approved aircraft inspection program (AAIP). The AAIP is divided into phase inspections, each consisting of four event cycles, 100 hours apart.

Examination of the maintenance records revealed that two separate inspection events were accomplished since the right engine was installed. An event number 2A inspection was accomplished on October 4, 2008, 114.3 flight hours before the accident, and an event number 1A inspection was accomplished on October 20, 2008, 21.2 flight hours before the accident.

A review of the operator's FAA approved AAIP inspection control sheet for a 2A event check revealed that item 40, which specifically relates to the inspection of the airplane's engine control rods and locking devices, states in part: "Visual inspection of assembly for security. Check for correct alignment of control rods and bars, levers, arms, and linkages for evidence of damage." Additionally, item 41 of the AAIP inspection control sheet requires that maintenance technicians accomplish a "functional test for torque" of the bolts and screws which attach levers and arms of serrated shafts of the fuel control, propeller pitch control, and governor.

On January 27, 2009, at the direction and under the supervision of the NTSB IIC, the accident

airplane's right propeller hub assembly was disassembled and inspected at Dominion Propeller, Inc., Anchorage. The impact damaged right propeller hub was received with three of the four composite propeller blades broken at or near the root of each propeller blade. The fourth propeller blade was cut about six inches from the propeller hub. The damaged propeller spinner was removed, exposing the underlying propeller dome, propeller hub, and each propeller blade grip. An examination of the propeller hub assembly revealed all four propeller blades remained attached to the propeller hub, with no evidence of propeller blade slippage within the blade grips. The four propeller blade grips had impact score marks which matched corresponding score marks on the propeller dome. According to a technician with Dominion Propeller, Inc., the score marks could only be attained during impact, and while all four propeller blades were at, or near, the flight-idle position. The propeller inspection revealed no preaccident mechanical anomalies.

The Safety Board did not take custody of the wreckage, and no parts or components were retained.

#### ADDITIONAL INFORMATION

According to the operator's director of maintenance, company management personnel elected to install a bolt to the PPC mechanical linkage, which provides a secondary means of attachment. The bolt screws into the previously threaded splined shaft of the PPC. The bolt installation is considered by the FAA as a minor repair or alteration requiring no FAA field approval prior to installation. The director of maintenance also noted that all of the company's Casa 212's were modified immediately after this accident.

#### History of Flight

Approach-VFR pattern final	Powerplant sys/comp malf/fail (Defining event)
Approach-VFR go-around	Loss of control in flight Collision with terr/obj (non-CFIT)

#### Pilot Information

<b>Certificate:</b>	Airline Transport	<b>Age:</b>	27, 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; Instrument Airplane	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 None	<b>Last FAA Medical Exam:</b>	08/22/2008
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	7849 hours (Total, all aircraft), 3455 hours (Total, this make and model), 5891 hours (Pilot In Command, all aircraft), 320 hours (Last 90 days, all aircraft), 46 hours (Last 30 days, all aircraft), 7 hours (Last 24 hours, all aircraft)		

## Co-Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	24, Female
<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>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Without Waivers/Limitations	<b>Last FAA Medical Exam:</b>	09/22/2008
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	970 hours (Total, all aircraft), 667 hours (Total, this make and model), 114 hours (Last 90 days, all aircraft), 37 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	CONSTRUCCIONES AERONAUTICAS SA	<b>Registration:</b>	N437RA
<b>Model/Series:</b>	CASA-212	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	166
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	10/27/2008, AAIP	<b>Certified Max Gross Wt.:</b>	17086 lbs
<b>Time Since Last Inspection:</b>	21 Hours	<b>Engines:</b>	2 Turbo Prop
<b>Airframe Total Time:</b>	26006 Hours at time of accident	<b>Engine Manufacturer:</b>	Honeywell
<b>ELT:</b>	C91A installed, activated, did not aid in locating accident	<b>Engine Model/Series:</b>	TPE331
<b>Registered Owner:</b>	ARCTIC TRANSPORTATION SERVICES INC	<b>Rated Power:</b>	900 hp
<b>Operator:</b>	ARCTIC TRANSPORTATION SERVICES INC	<b>Operating Certificate(s) Held:</b>	On-demand Air Taxi (135)

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Dusk
Observation Facility, Elevation:	OOK, 59 ft msl	Observation Time:	1856 ADT
Distance from Accident Site:		Direction from Accident Site:	
Lowest Cloud Condition:		Temperature/Dew Point:	1°C / -1°C
Lowest Ceiling:	Broken / 5500 ft agl	Visibility	6 Miles
Wind Speed/Gusts, Direction:	6 knots, 230°	Visibility (RVR):	
Altimeter Setting:	29.75 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	Light - Mist		
Departure Point:	Bethel, AK (BET)	Type of Flight Plan Filed:	Company VFR
Destination:	Toksook Bay, AK (OOK)	Type of Clearance:	None
Departure Time:	1822 ADT	Type of Airspace:	

## Airport Information

Airport:	Toksook Bay Airport (OOK)	Runway Surface Type:	Gravel
Airport Elevation:	59 ft	Runway Surface Condition:	Snow
Runway Used:	16	IFR Approach:	Visual
Runway Length/Width:	3218 ft / 60 ft	VFR Approach/Landing:	Full Stop

## Wreckage and Impact Information

Crew Injuries:	2 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Minor	Latitude, Longitude:	60.541389, -165.087222 (est)

## Administrative Information

Investigator In Charge (IIC):	Clinton O Johnson	Adopted Date:	03/03/2010
Additional Participating Persons:	Boyd B Waltman; Federal Aviation Administration (Airworthiness); Anchorage, AK James R Montgomery; Federal Aviation Administration (Airworthiness); Anchorage, AK		
Publish Date:	03/03/2010		
Investigation Docket:	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.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

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