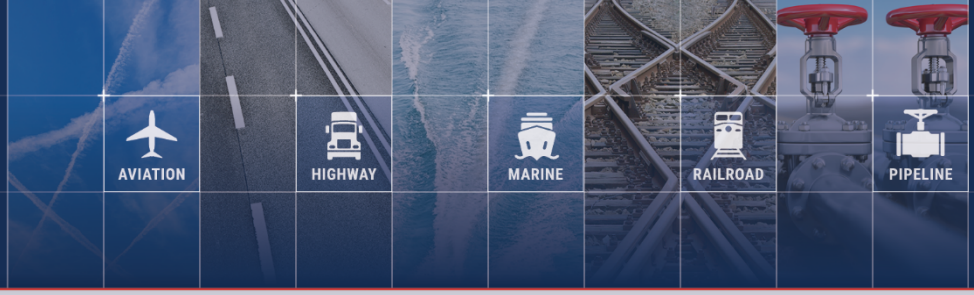

Aviation Investigation Final Report

Location:	Wasilla, Alaska	**Accident Number:**	ANC11LA039
Date & Time:	May 27, 2011, 16:20 Local	**Registration:**	N1742D
Aircraft:	Cessna 170A	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control on ground	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot said that, when the tailwheel-equipped airplane touched down during a three-point landing, it immediately veered sharply to the left and exited the runway. She was unable to regain control before the airplane collided with a ditch.

The airplane had recently been purchased, and the pilot did not have any flight time in the make and model prior to the purchase. The airplane had been modified with larger/taller main landing gears, larger diameter tires, and a tailwheel assembly from another model of airplane. The pilot said that when the previous owner demonstrated the airplane, he used heavy braking and excessive thrust to get the tailwheel to straighten out. He told her he always did wheel landings as opposed to three-point full stall landings.

A postaccident examination of the airplane revealed that the rotational plane of the tailwheel was not horizontal/parallel to the ground. There was a pronounced negative camber (aft downward tilt), which caused the tailwheel to rotate forward when weight was applied. The tailwheel spring had been extended aft from its normal position, which added additional negative camber. An engineer from the Federal Aviation Administration aircraft certification office said adjustments to the tailwheel should have been made to make the tailwheel's plane of rotation horizontal.

An examination of the airplane's airframe logbook revealed that the airplane's landing gear had been modified under a supplemental type certificate and multiple field approvals. The airplane had been inspected for maintenance conformity, but not engineering.

Due to the multiple landing gear modifications, it is likely that the airplane's landing characteristics were degraded, requiring greater pilot vigilance and skill, particularly during landing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's loss of directional control during landing, which resulted in a runway excursion. Contributing to the accident were the effects of multiple modifications to the main and tailwheel landing gear through the supplemental type certificate and FAA field approval process, which adversely changed their geometry, and resulted in degraded controllability during landing.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Understanding/comprehension - Maintenance personnel
Organizational issues	Oversight of reg compliance - FAA/Regulator
Aircraft	Landing gear steering system - Damaged/degraded

Factual Information

History of Flight

Landing-landing roll	Loss of control on ground (Defining event)
Landing-landing roll	Runway excursion
Landing-landing roll	Collision with terr/obj (non-CFIT)

On May 27, 2011, about 1620 Alaska daylight time, a tailwheel-equipped Cessna 170A airplane, N1742D, sustained substantial damage when it veered off the runway during landing at the Wasilla Airport, Wasilla, Alaska. The airplane was operated by the pilot as a visual flight rules (VFR) personal local flight under the provisions of 14 Code of Federal Regulations Part 91, when the accident occurred. The private pilot and sole passenger were not injured. Visual meteorological conditions prevailed, and no flight plan was filed.

During a telephone conversation with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC) on May 29, the pilot said when the airplane touched down during a three-point landing, it immediately veered sharply to the left, and exited the runway. She said she was unable to regain control before the airplane collided with a ditch. The left wing and the fuselage received substantial damage during the collision with the ditch.

The pilot said she had recently purchased the airplane, and prior to the purchase did not have any experience in a Cessna 170. Since the purchase, she has accumulated about 29 hours of flight time in the 170. The airplane had been modified with Cessna 180 main landing gear, and larger diameter tires. The airplane had been further modified with a "bird dog" tailwheel. She said when the previous owner demonstrated the airplane, he used heavy braking and excessive thrust to get the tailwheel to straighten out. He told her he always did wheel landings as opposed to three point full stall landings. The pilot said after purchasing the airplane, the original tailwheel had been put back on to help with controllability.

On July 8, 2011 the tailwheel assembly was examined by the NTSB IIC. The rotational plane of the tailwheel was not horizontal/parallel to the ground. There was a pronounced negative camber (aft tilt downward) in the rotational plane causing the tailwheel to rotate forward when weight was applied. The increased height of the Cessna 180 gear and taller tires added to the negative camber. The tailwheel spring had been extended aft from its normal position (indicated by old clamp marks), which added additional negative camber.

Additional Information

A review of the airframe logbooks showed four recent major airframe modifications:

(1) A main landing gear reinforcement kit was installed under supplemental type certificate

(STC) SA2918NM.

(2) The main landing gear spring legs and axles were replaced with Cessna model 180 main landing gear leg springs and axles, under the FAA field approval process. Instructions for continued airworthiness were to adjust wheel alignment using the procedure in Cessna Service Letter S.L.N.-56 dated 8-3-1948 or latest revision.

(3) The stock 6.00 x 6 tires and tubes were replaced with 8.50 x 6 tires and tubes, under the FAA field approval process. According to the description of work completed, the tundra tire worksheet and test flight for tire adverse effect was completed, however there was no flight test or return to service flight recorded in the airplane's logbook.

(4) The airplane's stock tailwheel spring was replaced with a "Bird Dog" spring under the FAA field approval process. The description of work accomplished states that all installation work was done in accordance with the Cessna 170 manual.

A Cessna accident investigator told the NTSB IIC that Cessna does not encourage or support the exchange of airplane components between differing models. He further stated that due to the differences in landing gear geometry of the stock airplane models, that airplane specific guidance in the airplane's maintenance manual would not be appropriate to guarantee the continued airworthiness of such a mixed configuration. With respect to the tailwheel installation, the 170 manual does not include the installation of the "bird dog" tailwheel on a 170 model airplane.

An engineer from the Anchorage, Alaska, FAA aircraft certification office (ACO) told the NTSB IIC that he concurred with the Cessna investigator's assessment, and said that due to the change in landing gear geometry, each airplane would have to be test flown/taxied for adverse affects, and specific alignment for that airplane ascertained. The appropriate wheel alignment should be annotated in the airplane's airframe logbook. He further stated that to operate properly the tailwheel plane of rotation should be approximately horizontal.

An aircraft mechanic whose company was responsible for the change of the main landing gear on the accident airplane, told the IIC his company does quite a few landing gear changes. Per past practice, the company's mechanics align the gear per the maintenance manual for the airplane, without regard for the dimensional changes in the gear.

The FAA inspector who signed the FAA 337 form (major repair and alteration) for the exchange of the main landing gear on the accident airplane, told the IIC that the accident airplane was inspected for conformity to best maintenance practices, not engineering. The FAA does not provide guidance for inspections involving the cumulative effect of multiple modifications.

The previous owner of the accident airplane said he owned the airplane for about 7 years, and had about 300 hours of flight time in the 170 model. He said after the modifications he did not notice any difference in the airplane's controllability.

Civil Air Regulation (CAR) 3.106

The Civil Air Regulation under which the accident airplane was certificated states in part: "The airplane must be satisfactorily controllable and maneuverable during takeoff, climb, level flight, dive and landing with or without power. It must be possible to make a smooth transition from one flight condition to another without an exceptional degree of skill, alertness, or strength on the part of the pilot... ."

FAA Advisory Circular (AC) 43-210

Appendix 1, states:

"Item 8—Compliance Statement and Compliance Checklist. Before completing the alteration or repair to your aircraft, be aware that after it has been altered or repaired the aircraft must still meet its certification basis. In block 8 you include the proof (data) that it still does. Your compliance statement should explain how your aircraft still meets its certification basis. For example, if you want to modify the wheels of your small airplane, you would need to ensure that the altered wheels still conform to Title 14 of the Code of Federal Regulations (14 CFR) part 23, section 23.731. The compliance checklist will list each affected 14 CFR/Civil Air Regulation (CAR) and indicate how compliance was shown. This checklist is created by the person doing the alteration or repair and should address each section of the regulations applicable to the project. Appendix 2, has a sample compliance checklist format."

"Item 9 (in part)—Previous Alterations or Repairs that May be Affected by This Alteration. Look at the aircraft and review its records to determine if there are any modifications, Supplemental Type Certificates (STC), alterations, or repairs that could cause a problem or conflict with the proposed alteration or repair."

"Item 10 (in part)—Instructions for Continued Airworthiness (ICA). In this attachment, describe how you will keep the altered or repaired part of the aircraft airworthy. This might include inspections that need to be done each 100 hours or during the annual inspection. These should be specific instructions that include what should be looked at and minimum or maximum measurements of parts for wear or deterioration. Troubleshooting, functional checks, installation and removal procedures, and servicing requirements."

Copies of entries from the airplane's airframe logbook, FAA 337 forms, and applicable regulations are contained in the docket for this report.

Pilot Information

Certificate:	Private	**Age:**	44,Female
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	August 6, 2010
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	August 25, 2010
Flight Time:	653 hours (Total, all aircraft), 29 hours (Total, this make and model), 540 hours (Pilot In Command, all aircraft), 15 hours (Last 90 days, all aircraft), 11 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N1742D
Model/Series:	170A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	20185
Landing Gear Type:	Tailwheel	**Seats:**	4
Date/Type of Last Inspection:	March 10, 2011 Annual	**Certified Max Gross Wt.:**	2200 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2804 Hrs	**Engine Manufacturer:**	CONT MOTOR
ELT:	C91 installed, not activated	**Engine Model/Series:**	C145 SERIES
Registered Owner:	Bradley R Subers	**Rated Power:**	145 Horsepower
Operator:	Bradley R Subers	**Operating Certificate(s) Held:**	None

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**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	21°C / 5°C
Precipitation and Obscuration:			
Departure Point:	Palmer, AK (PAAQ)	**Type of Flight Plan Filed:**	None
Destination:	Wasilla, AK (IYS)	**Type of Clearance:**	None
Departure Time:	15:45 Local	**Type of Airspace:**	

Airport Information

Airport:	Wasilla IYS	**Runway Surface Type:**	Asphalt
Airport Elevation:	354 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	21	**IFR Approach:**	None
Runway Length/Width:	3700 ft / 75 ft	**VFR Approach/Landing:**	Full stop;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	61.538887,-149.539443

Administrative Information

Investigator In Charge (IIC):	Lewis, Lawrence
Additional Participating Persons:	Jim Helberg; FAA; Anchorage, AK
Original Publish Date:	March 28, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=79239