National Transportation Safety Board
Aviation Accident Final Report

Location:	Fort Lauderdale, FL	**Accident Number:**	ERA13LA188
Date & Time:	04/01/2013, 1635 EDT	**Registration:**	VQ-TIN
Aircraft:	CESSNA 402C	**Aircraft Damage:**	Substantial
Defining Event:	Landing gear collapse	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

Before the accident flight, maintenance had been conducted on the foreign-registered airplane at a Federal Aviation Administration-authorized repair station. After takeoff, the pilot selected the landing gear to the "up" position. The pilot noticed that the main landing gear retracted but that the nose landing gear did not. He then "completed the emergency check," selected the gear "down" position, and subsequently observed three "gear down and locked" lights illuminate. After discussing the situation with an air traffic controller, the pilot decided to return to the airport to land. The touchdown was normal; however, during the landing roll, as the airplane decelerated, the nose landing gear collapsed, and the airplane's nose and propellers contacted the runway, which resulted in substantial damage to the airplane.

Examination of the nose landing gear assembly revealed that the nose landing gear actuator was intact, extended, and undamaged but that the rod end, which had its castellated nut still threaded onto it, was not connected to the nose landing gear drag brace. Review of maintenance records and discrepancy sheets revealed no evidence that maintenance had been performed on the nose landing gear assembly. However, review of worksheets that the operator had given to the repair station indicated that the operator had requested that nondestructive testing (NDT) be performed on the nose landing gear drag brace. Although the worksheets were supposed to be used to document the inspections, repair station personnel did not fill them out. However, a work order sent to the operator by the NDT technician, who was a contractor, did indicate that NDT had been performed on the nose landing gear drag brace.

The repair station's chief inspector stated that, for previous NDT of the nose landing gear brace, repair station personnel had always removed the part from the airplane. However, after the chief inspector met with the operator's mechanic and the pilot to discuss the maintenance to be performed, they decided that the repair station did not have to be involved in the NDT that day because the nose landing gear brace actually did not need to be removed for the NDT. Thus, the chief inspector did not enter the NDT on the discrepancy sheets.

The chief inspector reported that, initially, no one involved in the airplane's maintenance could remember if anyone had worked on or near the nose landing gear; however, a mechanic subsequently reported that he had disconnected and removed the bolt from the nose landing gear actuator at the request of the NDT technician to facilitate the NDT of the nose landing gear. The chief inspector further reported that neither the mechanic nor the NDT technician communicated to anyone that the bolt had been removed or took any actions that might have alerted anyone that the bolt was not in place; evidence indicates that the bolt was not reinstalled, which could have been detected during a postmaintenance inspection. However, the chief inspector reported that, because the nose landing gear drag brace inspection was not on the discrepancy sheet and it had not been removed for maintenance, it did not occur to him to inspect it before releasing the airplane to service. The inspector's failure to inspect the drag brace led to its being returned to service without the bolt attached and its subsequent failure.

The evidence indicates that confusion existed regarding what each person's and organization's responsibilities were and that a breakdown in communication occurred between the repair station personnel, the NDT technician, and the operator. These factors, coupled with the lack of oversight by the chief inspector, led to a breakdown in the controls put in place to detect and correct errors before an accident occurs.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The disconnection of the nose landing gear actuator, which resulted in the subsequent collapse of the nose landing gear. Contributing to the accident was the repair station's inadequate maintenance, postmaintenance inspection process, and oversight of the maintenance performed and the lack of communication between the repair station personnel, the operator, and the testing technician.

Findings

Aircraft	Nose/tail landing gear - Incorrect service/maintenance (Factor) Nose/tail landing gear - Not inspected (Factor) Nose/tail landing gear - Failure (Cause)
Personnel issues	Forgotten action/omission - Maintenance personnel (Factor) Installation - Maintenance personnel (Factor) Post maintenance inspection - Maintenance personnel (Factor) Lack of communication - Maintenance personnel (Factor)
Organizational issues	Maintenance records - Maintenance provider (Factor) Oversight of maintenance - Maintenance provider (Factor) Between groups/organizations - Maintenance provider (Factor) Between groups/organizations - Operator (Factor) Within group(s)/organization - Maintenance provider (Factor)

Factual Information

HISTORY OF FLIGHT

On April 1, 2013, at 1635 eastern daylight time, a Cessna 402C, Turks and Caicos Islands registration VQ-TIN, operated by Caicos Express Airways (CEA), was substantially damaged when the nose landing gear collapsed during landing rollout at Fort Lauderdale Executive Airport (FXE), Fort Lauderdale, Florida. The airline transport pilot was not injured. Visual meteorological conditions prevailed and an IFR flight plan was filed for the positioning flight, destined for Providenciales International Airport (MBPV), Providenciales, Turks and Caicos Islands. The flight was conducted under the provisions of Article 14 of the United Kingdom Air Navigation (Overseas Territories) Order 2007.

According to the pilot, the airplane had just had maintenance completed and the purpose of the flight was to return the airplane to MBPV to place it back in service. After departing from runway 26 at FXE, the pilot selected the landing gear to the "UP" position. The pilot noticed however, that the main landing gear retracted but, the nose landing gear did not. He then "completed the emergency check" and immediately selected "gear down". He then observed three "gear down and locked lights". After discussing the situation with air traffic control the pilot decided to return for landing on runway 13. The touchdown was normal, however during the rollout, as the airplane decelerated through 60 knots, the nose landing gear collapsed and the airplane's nose and propellers made contact with the pavement. The pilot also advised that prior to the nose landing gear collapse, he never heard a gear warning horn.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) and pilot records, the pilot held an airline transport pilot certificate with a rating for airplane multi-engine land. His most recent FAA first-class medical certificate was issued on October 23, 2012. He reported that he had accrued 10,566 total hours of flight experience, 3,507 of which were in the accident airplane make and model.

AIRCRAFT INFORMATION

According to Turks and Caicos Islands Civil Aviation Authority (TCI-CAA) and CEA records, the airplane was manufactured in 1980. Its most recent annual inspection was completed on March 16, 2013. At the time of the inspection, the airplane had accrued 8,524 total hours of operation.

METEOROLOGICAL INFORMATION

The recorded weather at FXE at 1653, included: wind 180 degrees at 5 knots, visibility 10 miles, sky clear, temperature 26 degrees C, dew point 17 degrees C, and an altimeter setting of 29.97 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

Examination of the airplane revealed that the fuselage nose structure behind the radome had been substantially damaged.

Examination of the nose landing gear assembly revealed that the nose landing gear actuator was intact, extended, and undamaged, but the rod end with its castellated nut still threaded onto it was not connected to the nose landing gear drag brace. Further examination of the nose

landing gear assembly also revealed that it would have been difficult for the pilot to discover that the nose landing gear actuator was disconnected from the nose landing gear drag brace, as the disconnected actuator was in an area that would be difficult for him to see or access.

TESTS AND RESEARCH

Review of Maintenance Records

According to FAA and TCI-CAA records, the repair station which performed the maintenance on the airplane; EA Management Services Inc. (EAMS), was authorized to perform both airframe and powerplant repair on CEA aircraft.

Review of the airplane's maintenance records revealed however, no evidence of any maintenance being performed on the nose landing gear assembly. Review of the EAMS defect work cards for the maintenance performed on the airplane also did not reveal any evidence of maintenance being performed on the nose landing gear assembly.

Review of the additional worksheets (Form CEA-124) which had been given to EAMS to be used to document additional inspections as part of the maintenance requested by CEA, indicated that the nose landing gear drag brace (Supplemental Inspection Number: 32-20-00) was requested to be performed. The documents however were discovered to have not been filled out by EAMS.

Review of a work order (Work Order: 2013-0051) that was sent to CEA by Ultimate NDT Inc. indicated however that non-destructive testing (NDT) had been performed on the nose landing gear drag brace in the form of a fluorescent penetrant inspection and that no cracks were noted at the time of the inspection.

CHIEF INSPECTOR'S STATEMENTS

According to EAMS's chief inspector, on March 24, 2013, the accident airplane was flown into FXE by the pilot and one of CEA's mechanics to have maintenance performed, which included an engine change and numerous Supplemental Inspections in accordance with Chapter 4 of the airplane maintenance manual. One of the mechanics that normally worked for the repair station was also contracted by CEA to assist in performing the maintenance for the duration.

According to the chief inspector, upon the airplane's arrival, they immediately began to prepare the airplane for the inspection and engine change as they had tentatively scheduled March 27, 2013 as the date that non-destructive testing (NDT) inspections were to be performed by a contractor. Using the work order instructions as a guide, the chief inspector prepared a list of the NDT inspections to be carried out by the NDT contractor. This list was compiled based on the chief inspector's knowledge of the airplane and his familiarity with its maintenance history.

The chief inspector's list included some additional inspections that were not originally included on the work order instruction supplied by CEA. This list was presented and after discussions with the mechanic from CEA and the pilot, it was decided that the repair station did not need to be involved in the inspection of the nose landing gear drag brace, because it did not necessitate the dismantling or separation of any parts. According to the chief inspector, this discussion happened on March 24, 2013 but, he was unable to recall the specific details, though according to him, "it was unequivocal that we had agreed that our help will not be needed in the performance of this inspection at this time." On previous inspections of the nose landing gear drag brace, the repair facility had always completely removed the drag brace from the airplane and the inspection was carried out with the part removed from the airplane. The chief

inspector also advised that they discussed the unavailability of paint stripper and the need to purchase some to carry out the inspection. After he was informed that this was not required he did not transfer that inspection to the out shop defect work cards (discrepancy sheets).

According to the chief inspector, they proceeded to complete the inspections, installations and other additional maintenance as required by CEA and on their work order. He advised that he was responsible for the supervision of all tasks and upon their completion; he did a final inspection, ground runs for the engine installation, and the control adjustments and release to service.

After the accident, when the examination found that the bolt that connected the nose gear drag link to the nose gear actuator was disconnected, initial questioning of all parties that were involved in the maintenance of the aircraft, as to whether anyone may have worked on and therefore disconnected the nose actuator bolt, was conducted. Everyone involved answered in the negative. No one at the time could remember anyone working on the nose landing gear or working in the vicinity of the nose landing gear.

Further questioning revealed that a mechanic had indeed disconnected and removed the bolt at the request of the NDT technician to facilitate an inspection on the nose landing gear. The mechanic and NDT technician at no time communicated this to anyone and did not take any further actions that may have alerted anyone to the bolt not being in place.

According to the chief inspector, they had performed this inspection numerous times at their facility and the contracted NDT technician had always had the nose landing gear drag brace removed, the inspection areas paint stripped, and then placed on a table, to conduct the inspection. According to the chief inspector they were unaware that this inspection could have been carried out in-situ on the aircraft. He advised that, since it was not on their discrepancy sheet, and since they did not remove it for maintenance, and being unaware that this inspection could have been carried out without the drag brace being removed from the aircraft, at no time did it occur to him to inspect the drag brace before the release to service.

History of Flight

Prior to flight	Aircraft maintenance event Aircraft inspection event
Takeoff	Miscellaneous/other
Initial climb	Landing gear not configured
Maneuvering	Attempted remediation/recovery
Landing	Off-field or emergency landing Landing gear not configured Landing gear collapse (Defining event)

Pilot Information

Certificate:	Airline Transport	**Age:**	38
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without Waivers/Limitations	**Last Medical Exam:**	10/23/2012
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	02/13/2013
Flight Time:	10566 hours (Total, all aircraft), 3507 hours (Total, this make and model), 10566 hours (Pilot In Command, all aircraft), 57 hours (Last 90 days, all aircraft), 32 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	CESSNA	**Registration:**	VQ-TIN
Model/Series:	402C	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	402C0227
Landing Gear Type:	Retractable - Tricycle	**Seats:**	10
Date/Type of Last Inspection:	03/16/2013, Annual	**Certified Max Gross Wt.:**	6850 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	8524 Hours	**Engine Manufacturer:**	Continental
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	TSIO-520-VB1F
Registered Owner:	Caicos Express Airways	**Rated Power:**	325 hp
Operator:	Caicos Express Airways	**Air Carrier Operating Certificate:**	Foreign Air Carrier (129)

Meteorological Information and Flight Plan

Observation Facility, Elevation:	FXE, 13 ft msl	**Observation Time:**	1653 EDT
Distance from Accident Site:	0 Nautical Miles	**Condition of Light:**	Day
Direction from Accident Site:		**Conditions at Accident Site:**	Visual Conditions
Lowest Cloud Condition:	Few / 5500 ft agl	**Temperature/Dew Point:**	26°C / 17°C
Lowest Ceiling:	None	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	5 knots, 180°	**Visibility (RVR):**	
Altimeter Setting:	29.97 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Fort Lauderdale, FL (FXE)	**Type of Flight Plan Filed:**	IFR
Destination:	Providenciales, FN (MBPV)	**Type of Clearance:**	IFR
Departure Time:	1635 EDT	**Type of Airspace:**	Air Traffic Control; Class D

Airport Information

Airport:	Fort Lauderdale Executive (FXE)	**Runway Surface Type:**	Asphalt
Airport Elevation:	13 ft	**Runway Surface Condition:**	Dry
Runway Used:	13	**IFR Approach:**	None
Runway Length/Width:	4000 ft / 100 ft	**VFR Approach/Landing:**	Full Stop; Precautionary Landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None		

Administrative Information

Investigator In Charge (IIC):	Todd G Gunther	**Adopted Date:**	03/26/2015
Additional Participating Persons:	Sheldon Serraneau; FAA / FSDO; Miramar, FL Stuart Hawkins; AAIB; Aldershot, FN Keith Malcolm; TCI-CAA; Grand Turk, FN		
Publish Date:	05/18/2016		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=86588		