National Transportation Safety Board
Aviation Accident Final Report

Location:	Green Township, NJ	**Accident Number:**	ERA17FA265
Date & Time:	08/06/2017, 1025 EDT	**Registration:**	N2854L
Aircraft:	NORTH WING FREEDOM	**Aircraft Damage:**	Substantial
Defining Event:	Aircraft structural failure	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The noncertificated pilot planned to conduct a local flight in an experimental amateur-built weight-shift control aircraft that he built. A witness reported that the pilot had difficulty with one of the cables as he prepared the wing (which was foldable for storage) for flight and that he used a ratchet strap to help pull into place a cable that held the wing open for flight. Shortly after takeoff, when the aircraft was at an altitude of about 50 ft, the wing partially folded, and the aircraft descended into the ground.

A postaccident examination of the wing revealed that the cross-bar restraint cable, which held the wing in its open position, was not attached at its shackle and hook fitting at the rear of the wing keel tube. Additionally, the nylon webbing strap, which was attached to the steel cable shackle and designed to be used as a handle to pull the cable in place, was torn and separated from one mounting point and torn but still attached to the other mounting point. The shackle likely did not disengage from the hook during flight because the locking mechanism on the hook remained intact, was undamaged, and functioned normally. Given the witness report of the pilot's difficulty pulling the crossbar restraint cable into place, as well as the damage to the nylon webbing handle used to pull the cable, it is likely that the pilot inadvertently placed the nylon handle in the attachment hook instead of the steel shackle. Shortly after takeoff, the nylon handle likely tore from its mount, which caused the wing to partially fold, precluding the aircraft's continued flight.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's improper preflight setup of the aircraft's foldable wing, during which he incorrectly attached a nylon strap loop pull handle, instead of the steel cable shackle at the end of the

strap, to its mounting hook. The nylon strap failed in flight, resulting in a partial collapse of the wing and the aircraft's descent and impact with terrain.

Findings

Aircraft	Attach fittings (on wing) - Incorrect use/operation (Cause)
Personnel issues	Inspection - Pilot (Cause)
	Installation - Pilot (Cause)

Factual Information

History of Flight

Prior to flight	Aircraft inspection event
Initial climb	Aircraft structural failure (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On August 6, 2017, about 1025 eastern daylight time, an experimental amateur-built North Wing Freedom weight-shift controlled aircraft, N2854L, was substantially damaged during an attempted departure from Trinca Airport (13N), Green Township, New Jersey. The noncertificated pilot was fatally injured. The aircraft was owned by the pilot who was operating it as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed for the local flight.

According to his son, the pilot custom-built the airframe himself. He purchased the wing from its manufacturer. On the day of the accident, the pilot transported the aircraft by trailer to 13N, where he met his son; the pilot planned to fly the aircraft for the first time. The pilot had previously received some flight instruction and conducted a solo flight in other similar aircraft.

The pilot's son recalled that, while preparing the aircraft for flight (which included opening the foldable wing), the pilot had some difficulty with one of the cables that ran down the center of the wing (the crossbar restraint cable). The pilot's son stated that the pilot had difficulty pulling the cable in place and had to use a separate cargo type "ratchet strap" as a tool to apply enough tension to the cable.

The pilot's son stated that the pilot performed two ground test runs on the turf runway and then took off. After takeoff, the aircraft drifted slightly to the left, corrected toward the right "too much," and then drifted to the left again. About 50 ft above the ground, the wing "folded" in the manner that it would fold for storage or transport, but the wing "kept its shape." The "nose" of the wing "went up" as the wingtips rotated in the aft direction. The aircraft then descended and impacted the runway. The engine ran continuously during the entire flight, which lasted about 20 seconds.

Pilot Information

Certificate:	None	**Age:**	63, Male
Airplane Rating(s):	None	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	None	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

According to Federal Aviation Administration records, the pilot did not possess an airman or a medical certificate. Federal aviation regulations require a sport pilot certificate or higher to operate this aircraft.

Aircraft and Owner/Operator Information

Aircraft Make:	NORTH WING	**Registration:**	N2854L
Model/Series:	FREEDOM	**Aircraft Category:**	Weight-Shift
Year of Manufacture:	2016	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental	**Serial Number:**	122EF51076414
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	1250 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	26 Hours at time of accident	**Engine Manufacturer:**	BMW
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	R1200
Registered Owner:	On file	**Rated Power:**	115 hp
Operator:	On file	**Operating Certificate(s) Held:**	None

The pilot built the aircraft in 2016 as an experimental amateur-built weight-shift-control trike-style aircraft. It had two seats oriented in a tandem. The North Wing Mustang 3-series model K20X fabric and aluminum tube wing (serial number 62189) was manufactured on March 19, 2016. The aircraft was equipped with a BMW model R1200 two-cylinder four-stroke engine and a three-blade ground adjustable composite propeller. The fuel tank capacity was 12 gallons. The engine was mounted in the rear of the trike in a pusher configuration. The overall

weight was estimated to be between 500 and 600 ponds. The Hobbs meter indicated 26.6 hours. According to the pilot's son, the aircraft had been inspected, but he did not recall any inspection or maintenance details.

The aircraft's wing could be folded for storage and transport and opened for flight. The inboard ends of the two crossbars were attached to a fitting that slid forward (for the folded storage position) and aft (for the open or flight position) along the main keel tube. The forward end of the crossbar restraint cable was permanently attached to the crossbar fitting. The aft end of the cable had a shackle that engaged a hook at the rear of the keel tube. The cable held the wing in the open position by pulling the crossbar fitting aft and holding it in the aft position, which then pushed the crossbars outward to hold the wing open.
To fold the wing, the crossbar restraint cable would be unhooked from the rear of the keel tube, which would cause the center crossbar fitting to slide forward. The crossbars and leading edge tubes could then rotate aft until they were nearly parallel with the keel tube.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	K12N, 583 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	1054 EDT	**Direction from Accident Site:**	38°
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	250°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	21°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Green Township, NJ (13N)	**Type of Flight Plan Filed:**	None
Destination:	Green Township, NJ (13N)	**Type of Clearance:**	None
Departure Time:	1025 EDT	**Type of Airspace:**	Class G

Aeroflex-Andover Airport (12N), Andover, New Jersey, located about 3 miles northeast of the accident site, was the nearest weather reporting station. At 1054, the reported weather at 12N included wind from 250° at 3 knots, temperature 21°C, dew point 12°C, and an altimeter setting of 30.12 inches of mercury.

Airport Information

Airport:	TRINCA (13N)	**Runway Surface Type:**	Grass/turf
Airport Elevation:	600 ft	**Runway Surface Condition:**	Dry; Vegetation
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	1924 ft / 135 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	40.964722, -74.783056

The aircraft impacted the left edge of the runway about 500 ft before the departure end. The fuselage came to rest in a cornfield alongside the runway at the end of the wreckage path, which was about 25 feet long and oriented on a magnetic heading of about 170°. The fuselage was located about 40 feet south of the wing. All major components were accounted for at the accident site. The wing was found partially folded toward its storage position and separated from the fuselage at its mounting brackets. The right wing strut was fractured about 18 inches below its attachment point to the leading edge. Blue paint transfer, consistent with the color of the propeller, was present on both sides of the fracture. Both flight control frame down tubes were buckled about 12 inches from their upper end. The right washout strut was found out of its installation hole and connected to its bungee cord. The aft flying wires were severed; the left wire was found entangled with propeller leading edge strip material. Both arms of the mast, which connect the wing to the fuselage, were bent toward the left and displayed several blue paint transfer marks, consistent with the color of the propeller.

The crossbar restraint cable remained intact and attached to its forward mounting location. The aft end of the cable, to which a "U"-shaped steel shackle was attached, was free and not attached to the hook (referred to as the baily block hook) located at the rear of the wing keel tube. The hook was equipped with a spring lock to keep the shackle engaged in the hook; the spring lock was found intact, and it functioned normally. A strip of nylon fabric webbing, which was attached to the shackle as a loop, had separated from one of its two mounting points. The loop served as a handle to pull the cable into place and allows the shackle to engage with the hook. A 2-inch-long tear was present in the center of the webbing, about ½ inch from its loose end, as shown in figure 1. The other end of the webbing remained attached to the shackle at its mounting point with short tears in the center of the strap on both sides of the mount.

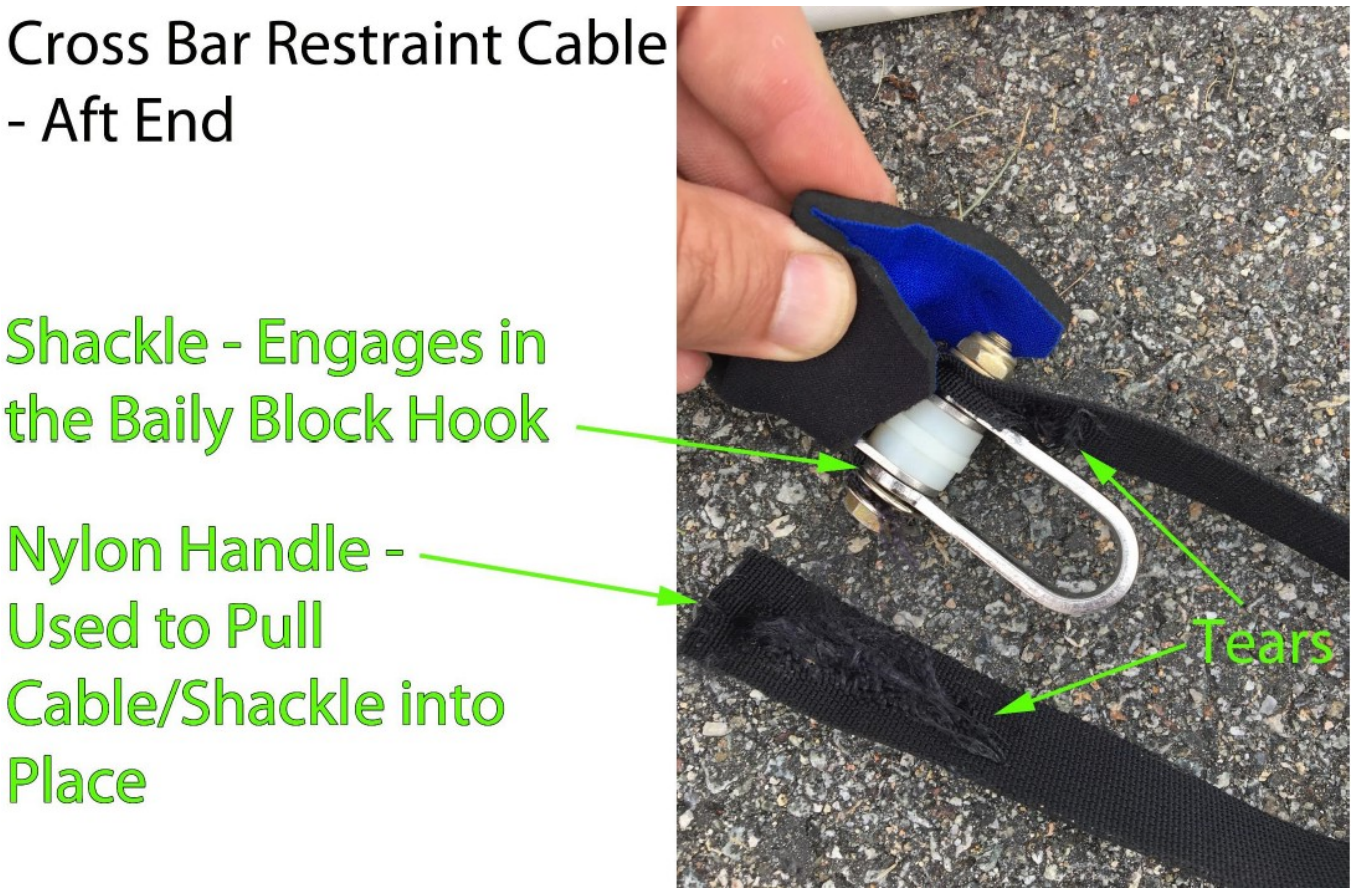

Figure 1. Cable shackle and pull handle. Note tears in nylon webbing.

The aircraft's forward frame was fractured and bent in several locations. The front (pilot's) seat was separated from the fuselage. The aft seat remained attached. The 12-gallon fuel tank was separated from the fuselage and was about 1/2 full. The ballistic airframe parachute system was intact and was not activated. The engine was mostly undamaged and the crankshaft rotated smoothly. Two of the propeller blades were fractured and splintered along their span, and the third blade was fractured at the hub and not found. An 8-inch section of flying cable sheathing was found embedded in one blade.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem external examination of the pilot was performed by the County of Morris Medical Examiner in Morristown, New Jersey. His cause of death was multiple blunt force injuries.

Toxicology testing performed at the FAA Forensic Sciences Laboratory was negative for carbon monoxide, ethanol, and all drugs screened.

Administrative Information

Investigator In Charge (IIC):	Douglass P Brazy	**Report Date:**	04/20/2020
Additional Participating Persons:	Tom Savickas; FAA/FSDO; Allentown, PA		
Publish Date:	04/20/2020		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=95751		