



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Slaton, TX	<b>Accident Number:</b>	CEN15LA138
<b>Date &amp; Time:</b>	02/05/2015, 1510 CST	<b>Registration:</b>	N602PB
<b>Aircraft:</b>	AIR TRACTOR INC AT 602	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Miscellaneous/other	<b>Injuries:</b>	1 None
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Ferry		

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## Analysis

The pilot, who had 3 hours of flight time in the agricultural airplane, was taking off on the planned cross-country flight, which was the first flight after the installation of a digital engine data monitor (EDM) on the airplane 6 days previously. The pilot reported that the initial takeoff seemed normal but that, halfway down the runway, red warning lights illuminated on the EDM. Although he reported that he thought the airspeed was low, the pilot was able to climb the airplane to 150 ft. The airplane lost altitude, and the pilot landed in a field. The landing gear dug into the soft dirt, and the airplane nosed over and came to rest inverted. The pilot added that, although he added full throttle, the engine never developed full power.

Examination of the airplane did not reveal any anomalies that would have prevented the engine from producing normal power. A review of the airplane's maintenance records showed that the EDM was installed under a supplemental type certificate, which included instructions and initial setup and installation checklists. However, a completed copy of neither the setup nor installation checklists were found in the records. The maintenance entry noted that ground runs and leak checks were completed, and no defects were noted.

Review of the EDM data revealed two files that contained engine starts; one from 3 days before the accident flight and one from the accident flight. The first data file showed that the engine propeller rpm reached a maximum of 950 rpm, indicating that this was a ground run and that the engine power setting was not increased above flight idle. During the accident flight, the engine propeller rpm reached a maximum of 1,730 rpm at an engine torque of 1,304 ft-lbs. Although the pilot said he advanced the throttle to obtain full power, a review of the EDM data revealed the torque was below its maximum value and was reduced several times during the flight.

Postaccident examination revealed that the EDM's engine operating range for the propeller was correctly set at the maximum 1,700 rpm; rpm readings above 1,700 would have been indicated by red warning lights. Based on the information, it is likely that the aircraft manufacturer set the maximum propeller rpm higher than 1,700 rpm (using the airplane's analog instruments), allowing the propeller rpm to exceed 1,700 rpm, which resulted in the red

lights illuminating, as reported by the pilot. If maintenance personnel had followed the initial setup/installation checklists that were included in the installation instructions for the EDM, they likely would have identified that the maximum propeller rpm was not set properly and corrected it. The accident is consistent with the pilot reacting to the EDM's warning indications, likely due to his lack of experience in the airplane make and model.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Maintenance personnel's improper installation of the engine data monitor (EDM), which was not in accordance with the supplemental type certificate instructions and resulted in engine warning indications and the pilot's subsequent reaction to the warning indications due to his lack of experience with the EDM and airplane.

### Findings

<b>Aircraft</b>	Maintenance/inspections - Incorrect service/maintenance (Cause)
<b>Personnel issues</b>	Total experience w/ equipment - Pilot (Cause) Installation - Maintenance personnel (Cause) Use of available resources - Maintenance personnel (Cause)
<b>Environmental issues</b>	Wet/muddy terrain - Contributed to outcome

## Factual Information

On February 5, 2015, about 1510 central standard time, an Air Tractor AT-602, airplane, N602PB, impacted terrain shortly after departing the Slaton Municipal Airport (F49), Slaton, Texas. The commercial rated pilot was not injured and the airplane was substantially damaged. The airplane was registered to Neal Aircraft, Inc., Slaton, Texas and operated by Frontier Ag Inc., Oakley, Kansas, under the provisions of the 14 Code of Federal Regulations Part 91 as a cross country flight. Visual meteorological conditions prevailed at the time of the accident.

The pilot reported that prior to departure the airplane was filled with fuel. After engine start, he taxied to runway 18, and conducted an engine run-up with no anomalies noted. The initial takeoff appeared normal; however, about half way down the runway, he noticed a "lack of airspeed" and the engine monitor was flashing "several red lights". About this time, the airplane became airborne. The pilot added that he was able to climb to about 150 feet, before he noticed an additional power loss. He kept adding throttle and even with full power selected, the airplane lost altitude. The pilot was able to land in a field south of the airport; however, the landing gear dug into the soft dirt and the airplane nosed over, coming to rest inverted. The pilot added that the engine never developed full power, even after adding full throttle.

Examination of the airplane by the responding Federal Aviation Administration (FAA) inspector revealed the vertical stabilizer and wings were substantially damaged, and the engine was fractured at the propeller reduction gearbox. The airplane was equipped with an AmSafe airbag system; however, the airbags did not deploy during the accident.

The airplane was recovered to a nearby hangar for further examination. The engine was removed from the airframe and sent to Pratt & Whitney, Service Investigation Center, in Bridgeport, West Virginia, for further examination. The associated engine pressure line (Py) line was retained for examination, at Air Tractor's facility in Olney, Texas. The Electronics International, MVP-50 Engine Monitor, which was recently installed, was downloaded for review. Pratt & Whitney, along with Air Tractor under the supervision of the FAA conducted an engine examination on April 1, 2015. The engine a PT6A-65AG had accumulated 273 hours, per the engine maintenance record, dated January 30, 2015. The gas generator module was deformed and had contact signatures with internal components. The compressor and power turbine rotational signatures were indicative of rotation at impact; however, the level of engine power produced could not be determined. Examination and bench testing of the fuel control unit, fuel pump and flow divider valve, did not reveal any defects. Additionally, a visual examination and disassembly of the propeller governor did not reveal any anomalies.

The flexible air signal line (Py) is a reference pressure line runs from the propeller governor on the forward end of the engine to the Fuel Control Unit (FCU). The line pressure is used by the FCU to regulate fuel flow to the engine. Complete loss of this pressure results in the FCU reducing fuel flow. The flexible line was installed by Air Tractor during aircraft production under Supplemental Type Certificate (STC) #SE8652SW and is a replacement for the Pratt & Whitney rigid Py line. Examination of the Py line was conducted by Air Tractor, on September 9, 2015, under the supervision of the NTSB. The line was pressurized using standard shop air pressure (approximately 125 psi) and was submerged in water to check for leaks. No air leakage was noted during the test.

The engine examination did not reveal any pre-impact anomalies that would have precluded

normal engine operation.

A review of the aircraft maintenance records revealed that the Electronics International Inc., MVP-50T, engine monitor's installation, was completed on January 30, 2015. The log entry noted that the monitor was installed under STC # SA02135SE. The entry noted that ground runs and leak checks were completed and no defects noted. The STC installation of the monitor included instructions, an initial setup, and installation checklists. A completed copy of either the setup or installation checklists, were not found in the records. The accident flight was the airplane's first flight after installation of the engine monitor. Review of the monitor's setup revealed the unit's clock was set to one hour earlier than local time, and the fuel flow calibration factor, was off by a factor of 10, meaning the monitor would indicate fuel flow ten times the actual fuel flow.

Each time electrical power is applied to the engine monitor a file is created. Download of the data revealed 32 data files, with dates ranging from January 19, 2015 to February 5, 2015. Only two of the files contained engine starts; February 2, 2015 and the accident flight on February 5, 2015. The data for the February 2nd file, logged a maximum reading of 950 rpm for the engine propeller.

Reviewing the February 5 data obtained from the engine monitor, showed propeller rpm increasing at 14:10:27 (engine monitor time), consistent with start of the takeoff roll. The rpm reading went to zero (propeller stops) at 14:11:41; about a one minute and fourteen second flight.

During the takeoff run, the propeller rpm reached 1,730 rpm at an engine torque of 1,304 ft-lbs. About 21 seconds after power was applied for the takeoff, the torque reached 1,492 ft-lbs, and was the maximum seen for the entire flight. The torque then dropped to about 1,200 ft-lbs and remained there for about 20 seconds before further reduction was noted. The propeller rpm remained at 1,730 rpm for about 32 seconds after maximum torque was reached, then dropped below 1,700 rpm, with a torque reading of 736 ft-lbs. The torque then dropped into the 500 ft-lbs range, before a slight increase was noted about 10 seconds before the crash; the rise was followed by a decrease in the torque.

The engine's maximum torque was 3,245 ft lbs, with a propeller maximum limit of 1,700 rpm. The maximum rpm would have been set on the propeller governor at Air Tractor, using the standard airplane's analog instruments.

The engine monitor's engine operating range for the propeller was correctly set at 1,700 rpm. Rpm readings above the maximum of 1,700 would have been indicated to the pilot by red warning light.

The pilot held a commercial pilot certificate and ratings for single engine-land and instrument-airplane. The pilot reported that he had 561 total flight hours and 3 hours in the accident airplane make and model.

## History of Flight

Prior to flight	Aircraft maintenance event
Takeoff	Miscellaneous/other (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

## Pilot Information

Certificate:	Commercial	Age:	23
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Single
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last Medical Exam:	01/29/2015
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	561 hours (Total, all aircraft), 3 hours (Total, this make and model), 514 hours (Pilot In Command, all aircraft), 24.1 hours (Last 90 days, all aircraft), 10.5 hours (Last 30 days, all aircraft), 2.2 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

Aircraft Manufacturer:	AIR TRACTOR INC	Registration:	N602PB
Model/Series:	AT 602	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Restricted	Serial Number:	602-1233
Landing Gear Type:	Unknown	Seats:	
Date/Type of Last Inspection:	11/07/2014, Annual	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Turbo Prop
Airframe Total Time:	273.1 Hours	Engine Manufacturer:	P&W
ELT:	Not installed	Engine Model/Series:	PT-6A
Registered Owner:	Neal Aircraft Inc.	Rated Power:	
Operator:	Frontier Ag Inc.	Air Carrier Operating Certificate:	Agricultural Aircraft (137)
Operator Does Business As:		Operator Designator Code:	HIXG

## Meteorological Information and Flight Plan

Observation Facility, Elevation:	KLBB	Observation Time:	1453 CST
Distance from Accident Site:	13 Nautical Miles	Condition of Light:	Day
Direction from Accident Site:	310°	Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Scattered / 25000 ft agl	Temperature/Dew Point:	6°C / 2°C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	5 knots, Variable	Visibility (RVR):	
Altimeter Setting:	30.25 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Precipitation		
Departure Point:	Slaton, TX (F49)	Type of Flight Plan Filed:	None
Destination:	Oakley, KS (KOEL)	Type of Clearance:	VFR
Departure Time:	1510 CST	Type of Airspace:	

## Airport Information

Airport:	Slaton Muncipal (F49)	Runway Surface Type:	
Airport Elevation:	3123 ft	Runway Surface Condition:	
Runway Used:	18	IFR Approach:	None
Runway Length/Width:	4244 ft / 75 ft	VFR Approach/Landing:	Forced 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):	Craig Hatch	Adopted Date:	01/05/2016
Additional Participating Persons:	Daniel Vengen; FAA FSDO; Lubbock, TX Kyle Schroeder; Air Tractor; Olney, TX		
Publish Date:	01/05/2016		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=90696">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=90696</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.