Aviation Investigation Final Report

Location:	Austin, Texas	**Accident Number:**	CEN15LA336
Date & Time:	August 4, 2015, 13:05 Local	**Registration:**	N17544
Aircraft:	Beech A36	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During a maintenance test flight, the airplane's fuel flow was slightly below normal, about 25-26 gallons per hour (gph) when it was normally 30-31 gph. The pilot selected the boost pump to "HIGH" and the fuel flow increased to 30 gph. A few seconds later, the fuel flow dropped to about 3 gph, and the engine stopped producing power. The pilot switched the boost pump off and on; however, the fuel flow did not chang. When the throttle was reduced, the engine momentarily surged. Engine power could not be restored, and the pilot performed a forced landing to a field.

An engine run was conducted after the accident, during which the engine again experienced a loss of power. The engine's fuel pump was removed and flow tested according to the supplemental type certificate holder's specifications. At an engine setting of 2,700 rpm, the fuel pump's flow pressure was 59.2 pounds per square inch (psi), above the maximum of 31 psi. The fuel pump's aneroid was found to be set incorrectly and was adjusted. During the subsequent flow test, the pump produced 31.3 gph. (The recommended maximum fuel flow for the fuel pump is 32 gph.) Review of maintenance logs revealed that the fuel pump was overhauled about 5 flight hours before the accident flight. It is likely that the aneroid was improperly set during this overhaul, which resulted in excessive fuel flow pressure.
The fuel pump was not the fuel pump recommended by the manufacturer; however, that did not play a role in the accident.

Probable Cause and Findings

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

A total loss of engine power due to an excessively rich fuel mixture as a result of the improper adjustment of the fuel pump aneroid.

Findings

Aircraft	Fuel pump - Incorrect service/maintenance

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Initial climb	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing-landing roll	Collision with terr/obj (non-CFIT)

On August 4, 2015, about 1305 central daylight time, a Beech A36 airplane, N17544, lost engine power near Austin, Texas. The pilot and passenger received minor injuries, and the airplane was substantially damaged, during the forced landing. The airplane was registered to N17544 LLC, and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight and no flight plan was filed. The local flight originated from the Austin-Bergstrom International Airport (KAUS), Austin, Texas, just prior to the accident.

The pilot reported that the engine's manifold pressure was decreasing at a lower altitude than normal and the high end fuel flow was not set properly. The purpose of the flight was to monitor the manifold pressure and fuel flow, and then make adjustments to the turbonormalizer wastegate system and fuel pump. Prior to flight, the mechanic had also repaired a minor induction leak.

The pilot described the takeoff roll as "normal" and the engine produced "full power". Immediately after rotation, about 150 ft above ground level, the fuel flow was slightly below normal, about 25 to 26 gallons per hour (GPH) when it was normally 30 to 31 GPH. The pilot reported that this was not unusual since the fuel pump was overhauled a few hours prior to the flight. The pilot selected the boost pump to "HIGH" and the fuel flow increased to 30 GPH and stabilized. A few seconds later, the fuel flow dropped to about 3 GPH and the engine stopped producing power. The pilot switched the boost pump off and on and the fuel flow did not change. When the throttle was reduced, the engine momentarily surged. Engine power could not be restored, so the pilot performed a forced landing to a field.

The airplane was transported to a secure facility for further examination. The airplane was equipped with a J.P. Instruments Engine Data Monitor which was downloaded. During the accident flight it recorded the following:

TIME RPM Fuel Flow (GPH)
1301:10 2628 24.9
1301:16 2628 24.5
1301:22 2628 24.2
1301:28 2628 24
1301:34 2628 24
1301:40 2637 29.1
1301:46 2637 28.3

1301:52 2625 27.1
1301:58 2635 25.7
1302:04 2629 27.3
1302:10 1503 3.9

Reviewing the data for previous flights found the fuel pressure readings to be intermittent on numerous flights. On several flights fuel pressure varied with fuel flow especially at high RPM settings; however for numerous flights, the fuel pressure remained at 6.4 psi and did not fluctuate.

An engine test run was conducted on October 29, 2015, with the engine still mounted on the airplane. In addition to investigators from the National Transportation Safety Board, representatives from Continental Motors, Textron Aviation, and Tornado Alley attended the engine run. The engine started and reached maximum rated power and then lost engine power. The maximum recorded fuel flow was 33.3 GPH. The electric fuel boost pump was turned on and engine power was momentarily restored, but then the engine lost power again. The maximum fuel flow with the boost pump on was 31.2 GPH. The fuel pump was examined and found to be part number 646210-2 which was not the engine manufacturer's recommended fuel pump for this model of engine. According to the representative from Tornado Alley, the pump was also not the one recommended by Tornado Alley, the correct part number should have been FT-B8.5/1-632818-2.

The fuel pump was removed and sent to Great Planes Fuel Metering for flow testing. Under the auspices of the Federal Aviation Administration, the fuel pump was flowed against Tornado Alley's FT-B8.5/1-632818-2 specifications. For an RPM setting of 2,700, the fuel pump's flow pressure was 59.2 psi; the maximum pressure for the pump should be 31 psi. When the fuel pump's flow pressure was reduced to 31 psi, the pump provided a fuel flow of 51.5 GPH. The recommended maximum fuel flow for the fuel pump is 32 GPH. When the aneroid was adjusted for the correct pressure setting, the pump produced 31.3 GPH. The engine data monitor system did not record fuel flows comparable to those found during testing. It could not be determined why there was a discrepency between the testing results and recorded engine performance.

A review of the engine's maintenance history revealed that the Continental IO-520-BA12A engine had been modified in 2001 via supplemental type certificate for a Tornado Alley conversion. The engine was overhauled on December 28, 2014 and the last annual inspection was completed on January 2, 2015. On June 23, 2015, the fuel pump, part number 646210-2, was overhauled at the request of the airplane's owner. An Authorized Release Certificate Form 8130-3, contained a remark, "Overhauled calibrated good as per TCM fuel injection OH manual." On June 30, 2015, the fuel pump was reinstalled on the engine, the fuel flow was adjusted, and the airplane was returned to service.

It could not be determined when the incorrect fuel pump was originally installed on the airplane.

Pilot Information

Certificate:	Private	**Age:**	34,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
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:**	April 16, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 5, 2014
Flight Time:	3400 hours (Total, all aircraft), 2000 hours (Total, this make and model), 60 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N17544
Model/Series:	A36	**Aircraft Category:**	Airplane
Year of Manufacture:	1976	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E-977
Landing Gear Type:	Unknown	**Seats:**	6
Date/Type of Last Inspection:	January 2, 2015 Annual	**Certified Max Gross Wt.:**	3651 lbs
Time Since Last Inspection:	102 Hrs	**Engines:**	Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	IO-520-BA12A
Registered Owner:	On file	**Rated Power:**	285 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KAUS,495 ft msl	**Distance from Accident Site:**	2 Nautical Miles
Observation Time:	12:53 Local	**Direction from Accident Site:**	294°
Lowest Cloud Condition:	Scattered / 4800 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	33°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Austin, TX (AUS)	**Type of Flight Plan Filed:**	None
Destination:	Austin, TX (AUS)	**Type of Clearance:**	VFR
Departure Time:	13:00 Local	**Type of Airspace:**	

Airport Information

Airport:	AUSTIN-BERGSTROM INTL AUS	**Runway Surface Type:**	
Airport Elevation:	542 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Minor	**Latitude, Longitude:**	30.167778,-97.639999(est)

Administrative Information

Investigator In Charge (IIC):	Aguilera, Jason
Additional Participating Persons:	Arnold Turner; FAA; San Antontio, TX John Kent; CMI; Mobile, AL Peter Basile; Textron Aviation; Wichita, KS Bilby Wallace; Tornado Alley Turbo, Inc; Ada, OK
Original Publish Date:	March 6, 2017
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=91709