Aviation Investigation Final Report

Location:	GARWOOD, Texas	**Accident Number:**	FTW00LA168
Date & Time:	June 1, 2000, 19:20 Local	**Registration:**	N8886S
Aircraft:	Air Tractor AT-301	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The commercial pilot had dispensed his 4th load of fertilizer for the day and was returning to the airstrip, when he reported a vibration, followed by a loss of engine power. During the forced landing, another pilot observed the airplane hit a ditch between two rice fields, and then nose over. The integrity of the fuel system was not compromised during the impact sequence. There was no evidence of fuel found at the accident site during an examination the day after the accident. Fuel stains were found on the bottom of the right wing. During an engine test run, the engine ran rough, backfiring, and cutting out momentarily throughout the normal power range. When the engine was run at power, on only the left magneto, the engine maintained 28 inches of manifold pressure at 2,000 RPM; however, it would still cut out from time to time. Removal and examination of the right magneto revealed that the internal brass gear splines were worn and brass particles were scattered within the magneto. Removal, bench testing, and examination of the carburetor revealed that the float movement was rough, the orifice of the float valve was too large, the float was set too low, and the accelerator pump did not work well. The carburetor had been removed, overhauled, reinstalled, and returned to service approximately 3 weeks prior to the accident. The seat belt and shoulder harness were found fastened, and the pilot was wearing his helmet. The curved overturn tube, located in the upper portion of the cockpit, was crushed inward. According to the manufacturer representative, a service bulletin was issued on March 23, 1991, for the installation of a cockpit overturn skid plate as an added safety feature. The skid plate had not been installed in the accident aircraft.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the loss of engine power in cruise flight as a result of the failure of the right magneto. A contributing factor was the lack of suitable terrain for the forced landing.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE

Findings
1. (C) IGNITION SYSTEM,MAGNETO - FAILURE
2. FUEL SYSTEM,CARBURETOR - INCORRECT
3. MAINTENANCE,OVERHAUL - IMPROPER - OTHER MAINTENANCE PERSONNEL

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: NOSE OVER
Phase of Operation: EMERGENCY LANDING

Findings
4. (F) TERRAIN CONDITION - NONE SUITABLE
5. TERRAIN CONDITION - BERM

Factual Information

HISTORY OF FLIGHT

On June 1, 2000, at 1920 central daylight time, an Air Tractor AT-301 agricultural airplane, N8886S, impacted the terrain during a forced landing following a loss of engine power near Garwood, Texas. The airplane, owned by ANF Air Service, Inc., of Garwood, Texas, was operated under 14 Code of Federal Regulations Part 137. The commercial pilot, sole occupant, was fatally injured, and the airplane sustained substantial damage. Visual meteorological conditions prevailed for the aerial application flight, and a flight plan was not filed. The local flight originated from a private turf airstrip approximately 30-45 minutes prior to the accident.

The pilot had dispensed his last load of fertilizer for the day on the rice field and was returning to the airstrip, when he radioed to the pilot of another aircraft that his airplane was vibrating, but he had full engine power. The other pilot observed N8886S at 150-100 feet agl on a southwest heading. This pilot flew his airplane past N8886S however, he did not see anything loose on the airplane. He told the pilot of N8886S that there was a farm strip about 1 1/2 miles west of his position. The pilot of N8886S responded that he "would make it back to the home strip." About 15 seconds later, the pilot of N8886S radioed "it quit." The pilot of the other aircraft observed N8886S descend at a 15-20 degree attitude with the wings level. The airplane (N8886S) hit a ditch between two rice fields. The airplane "hit the ditch engine first and turned over." The observing pilot reported clear skies with unlimited visibility and a southwest wind of 8 knots.

According to the operator, this was the pilot's fourth aerial application flight of the day in N8886S. The operator did not maintain refueling records for the aircraft. The fueling personnel recalled having fueled the aircraft during the day; however, they did not recall the time of the last refueling.

PERSONNEL INFORMATION

The FAA pilot records, reviewed by the NTSB investigator-in-charge (IIC), revealed the pilot was issued his private pilot certificate in 1956, with the airplane single-engine land rating. In October 1957, the certificate was upgraded to a commercial pilot certificate. In April 1958, the pilot was issued a limited flight instructor certificate single-engine land rating. In February 1969, the multiengine airplane rating was added to the pilot's commercial certificate, and in November 1970, he added the instrument rating. The pilot obtained his airplane single-engine seaplane rating in August 1971. In February 1973, the pilot obtained a type rating in the Lockheed L-18 airplane. On October 14, 1969, the pilot was issued a mechanic certificate with airframe and powerplant ratings.

The records submitted by the operator, indicated that the pilot's total accumulated time was 30,335.8 flight hours, of which 26,844.9 hours were in single-engine land airplanes. The pilot held a second class medical certificate issued January 27, 2000, with the limitation "must wear corrective lenses when flying." The pilot's last biennial flight review was performed on January 28, 2000, in a Cessna 172 single-engine airplane.

AIRCRAFT INFORMATION

A review of the aircraft records, by the NTSB IIC, revealed the airplane, model AT-301, serial number 301-0227, was manufactured in 1979 by Air Tractor, Inc, with a P & W, R1340-AN-1, radial engine installed. The FAA airworthiness certificate was issued October 11, 1979. The aircraft was registered to the current owner on March 11, 1996.

A SATLOC Global Positioning System (GPS) was installed in January 1996. In February 1998, the Hamilton Standard propeller, 12D40610A-12, serial number H7691, was overhauled and installed on the engine. In March 1999, the P & W engine, R1340-AN-1, serial number ZP-102091, was disassembled due to a propeller strike, inspected, repaired, test run for 2 hours, and returned to service. All flight controls were removed and all flight control hardware replaced in April 1999. The left magneto, a Bendix type SB9RN, serial number DC005208, was removed and replaced with an overhauled magneto, serial number 132348, on April 26, 2000. The Bendix carburetor model NAY9E1, serial number 5831479, was removed, overhauled, and returned to service on May 8, 2000.

On March 20, 2000, the last 100-hour inspection was performed on the engine at an accumulated time of 1,425.0 flight hours since its last overhaul. The last annual inspection was performed on March 20, 2000, at an accumulated aircraft time of 7,912.7 flight hours.

WRECKAGE AND IMPACT INFORMATION

The FAA inspectors and the aircraft manufacturer's representative, who responded to the accident site (29.26.1343 degrees North 096.29.1052 degrees West) on the day after the accident, found the airplane resting inverted approximately 50 feet southwest of a pond. There were tire tracks found in the water on the southwest edge of the pond, and ground scars extended from the pond to a 3-foot dirt mound. The nose of the airplane was about 10 feet beyond the dirt mound. The vertical stabilizer and rudder were structurally damaged.

The engine and propeller were found attached to the engine mount that remained attached to the airframe. The propeller blades were bent aft.

Flight control continuity was confirmed.

The FAA inspector reported that he opened a fuel line to the engine and found no fuel in the line. There was no evidence of fuel found at the accident site. He noted evidence of fuel stains on the bottom surface of the right wing. The integrity of the fuel system was not

compromised during the impact sequence.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed by the Office of the Medical Examiner of Travis County, Austin, Texas.

The aviation toxicology tests were performed by the FAA Civil Aeromedical Institute's (CAMI) Forensic Toxicological and Accident Research Center. The CAMI toxicological findings were negative.

SURVIVAL ASPECTS

The seat belt and shoulder harness were found fastened. The pilot was wearing his helmet. The curved overturn tube, located in the upper portion of the cockpit, was crushed inward. According to the manufacturer representative, Air Tractor, Inc., Service Bulletin 97 was issued on March 23, 1991, for the installation of a cockpit overturn skid plate as an added safety feature. The skid plate had not been installed in the accident aircraft.

TEST AND RESEARCH

On July 21, 2000, under the supervision of the NTSB IIC, a new propeller was installed on the engine at the facilities of Air Salvage of Dallas in Lancaster, Texas, for an engine run. The engine remained mounted to the airframe and a temporary fuel supply was plumbed to the header tank. The battery was charged and connected to the airframe battery cables. The wobble pump was operated and fuel was delivered to the carburetor. The primer and throttle were pumped and the engine cranked with the electric starter. The engine started and ran at idle. A magneto check at 1,800 RPMs revealed zero drop on the left magneto, and the engine cut out on the right. The cockpit controls were checked for proper installation. The engine was run at various power settings for 20 minutes. The engine ran rough, backfiring, and cutting out momentarily throughout the normal power range. When the engine was run on only the left magneto, the engine maintained 28 inches of manifold pressure at 2,000 RPM's however, it would still cut out from time to time.

The right magneto, Bendix type SB9RN, specification 28159-C, part number 24953-3, serial number DC012807, was removed from the engine. The internal brass gear splines were worn and brass particles were scattered within the magneto.

On August 9, 2000, under the supervision of an FAA inspector, the Bendix carburetor, model NAY9E1, serial number 5831479, which had been removed from the engine, was examined. When the carburetor was placed on the test bench, the test bench was turned on, and the fuel pressure was set at 4.5 psi to the carburetor. According to the FAA inspector, there was "very little fuel flow when the throttle controls were manipulated, [and] it appeared that the accelerator pump was non-functioning." Subsequently, the carburetor was removed from the

test bench, the top cover was removed from the carburetor, and the carburetor was placed back on the test bench. The carburetor "float was stuck down and did not release" until the "float was tapped." The accelerator pump "started working, but not well."

The carburetor was removed from the test bench for further teardown. The FAA inspector reported that "the fulcrum shaft attaching the float was stiff in the housing." According to the FAA inspector, this "caused the float movement to be rough." The float level was checked against the maintenance manual. The acceptable limits for the float level are 1/4th +/- 1/64th inch. The float level was found at a 23/64-inch setting. According to the FAA inspector, this measurement is "significantly higher than the acceptable limits in the maintenance manual." The FAA inspector found that the float valve, part number P60064-1605, was incorrect for this part number carburetor. The installed float valve is dimensionally the same as the proper valve, part number P21260-998 (orifice size 998); however, the orifice size on the installed valve was found to be 1605, a larger size orifice. According to the FAA inspector, with the "larger orifice size, the installed float valve would allow more fuel flow than that for the approved float valve."

ADDITIONAL DATA

The SatLoc GPS system, serial number AS9612121953, was examined for flight data. According to the manufacturer, there was no data recorded for the flights conducted on the day of the accident.

The airplane was released to the owner's representative.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	65,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Center
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	January 27, 2000
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	30336 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Air Tractor	**Registration:**	N8886S
Model/Series:	AT-301 AT-301	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	301-9227
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	March 20, 2000 Annual	**Certified Max Gross Wt.:**	5000 lbs
Time Since Last Inspection:	187 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	8100 Hrs	**Engine Manufacturer:**	P&W
ELT:		**Engine Model/Series:**	R1340-AN-1
Registered Owner:	MICHAEL THOMPSON	**Rated Power:**	600 Horsepower
Operator:		**Operating Certificate(s) Held:**	
Operator Does Business As:	ANF AIR SERVICE	**Operator Designator Code:**	A3NG

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:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	225°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	90°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(NONE)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	18:50 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	29.449235,-96.509666(est)

Administrative Information

Investigator In Charge (IIC):	Roach, Joyce
Additional Participating Persons:	ROBERT A DAILEY; HOUSTON , TX JIM HIRSCH; OLNEY , TX
Original Publish Date:	July 17, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=49330