National Transportation Safety Board
Aviation Accident Factual Report

Location:	ALMYRA, AR	**Accident Number:**	FTW96LA286
Date & Time:	07/01/1996, 1205 CDT	**Registration:**	N7314C
Aircraft:	Air Tractor AT-502	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Serious
Flight Conducted Under:	Part 137: Agricultural		

On July 1, 1996, at 1205 central daylight time, an Air Tractor AT-502, N7314C, registered to and operated by Hartley Flying Services, Inc., was destroyed during impact with terrain/water following a loss of control while maneuvering near Almyra, Arkansas. The commercial pilot sustained serious injuries. Visual meteorological conditions prevailed for the Title 14 CFR Part 137 local aerial application flight. A flight plan was not filed for the flight that originated at a private airstrip approximately 6 miles west of the accident site.

During telephone interviews, conducted by the investigator-in-charge, and on the Pilot/Operator Report the pilot reported that during the turn around maneuver, he extended full flaps. He further stated that the "flaps remained fully extended thus jamming [the flight] controls [and] the airplane continued to turn, making two or three turns before crashing into the water." The airplane came to rest in the Tindall Reservoir approximately 250 feet off-shore where the water depth was approximately 3 feet.

During an interview, conducted by the investigator-in-charge, manufacturer personnel revealed the following information. In the AT-502, "all conventional types of turns may be performed." Flaps "may be used as a turning aid providing small deflections are used (5 to 8 degrees)."

During telephone interviews, conducted by the investigator-in-charge, another pilot conducting loading and reloading from the private airstrip, reported observing N7314C arriving and departing from the private airstrip; however, he did not observe the accident. A feed truck driver, working close to the farm where the accident occurred, reported to the investigator-in-charge that he saw several agricultural airplanes flying in the area; however, he did not observe the accident.

A review of the airplane records, by the investigator-in-charge, revealed that the airplane was manufactured in 1986 by Air Tractor, Inc., as a model AT-501 with the P & W R1340 radial engine installed. In 1989 the operator purchased the airplane, converted it to a model AT-502 airplane, and installed the P & W PT6A-34 turbine engine. The last maintenance entry referring to the control surfaces was made on January 11, 1993, and it indicated that new flap,

aileron, rudder, and elevator bearings were installed and the rudder cables and pulleys were replaced. An annual inspection was completed on January 15, 1996.

The commercial pilot reported having 2,243.3 hours in this make and model of aircraft. The pilot's flight time in airplanes with a turbine engine was not made available to the Board.

The FAA inspector, the operator and the manufacturer's representative examined the airplane during the recovery from the water. The wing leading edges were crushed aft toward the spar. The integrity of all fuel tanks was compromised. The propeller separated from the engine which had separated from the airframe. The propeller blades exhibited bending and torsional twisting. Flight control continuity was confirmed. The wing flap actuator components were intact and the extension of the jackscrew was measured to be "slightly less (1/32) than 3 1/2 inches."

On November 12, 1995, Air Tractor issued Service Letter #140 (copy enclosed) to "prevent a possible overrun of the flap control system causing the flap push rod to bind on the aileron push rod making aileron control difficult." Service Letter #140 had not been accomplished on N7314C.

An FAA inspector examined N7314C at the storage facility in Clinton, Arkansas, and measured the flap actuator jackscrew at 3 1/2 inches. The inspector removed the flap actuator assembly and forwarded the assembly to the investigator-in-charge for examination.

Upon examination by the investigator-in-charge and the manufacturer representative, the flap actuator jackscrew extension measured 3 1/2 inches and operated throughout its design range of travel to the installed mechanical stop set at 3 11/16 inches. According to the manufacturer representative, with the jackscrew at 3 1/2 inches, flap extension would be 26 + or -1.5 degrees and the flap actuator at full stop (3 11/16 inches) would extend the flaps 30 degrees. The flap motor coupling rotated and drove the jackscrew. There was no physical evidence of a loss of roller balls from the flap actuator. The microswitch mounting bracket was not deformed and the flap up and down limit microswitches functioned per design.

In September 1996, the investigator-in-charge and manufacturer personnel examined a flap actuator assembly at Olney, Texas. The mechanical stop of the actuator was set at 3 6/16 inches with 26.5 degrees of flap travel. When the flap actuator jackscrew was extended to 4 1/16 inches, the roller balls would start to fall out of the actuator and at 5 1/16 inches all of the roller balls were lost from the actuator.

A production Air Tractor AT-502 was examined and during that examination the following parameters were observed. The flap actuator assembly jackscrew extended to 3 5/16 inches placed the flap extension within the manufacturer specifications of 26 + or - 1.5 degrees. The jackscrew, extended to 3 14/16 inches, placed the flap torque tube against the flap microswitch bracket and the flap extension at 31 degrees. The microswitch bracket was removed. With the jackscrew extended to 4 2/16 inches, which placed the flap extension at 34.5 degrees, the flap push rod touched the aileron push rod. There was some perceptible scraping on the aileron

push rod when the cockpit control stick was moved laterally; however, the controls continued to be movable with an estimated 4 pounds of force on the cockpit control stick. In order to get the flap push rod into a binding position with the aileron push rod, it was necessary to shorten the aileron rigging by 9/16 inch and to disconnect the aileron stop at the aileron bellcrank assembly. In this out of rig condition, approximately 10 pounds of control stick pressure was applied to remove the push rods from the binding condition.

Additional examination of the push rods was performed. Micrometer measurements of the flap push rod and the aileron push rod clearances were recorded with the flaps retracted and with the flaps extended. In the flap retracted position with the cockpit control stick left (full aileron), the clearance between the left flap push rod and the left aileron push rod was .158 inch. In the flap retracted position with the cockpit control stick right (full aileron), the clearance between the right flap push rod and the right aileron push rod was .173 inch. In the full flap (26 degrees) extended position with the cockpit control stick right (full aileron), the clearance between the right flap push rod and the right aileron push rod was .391 inch and the clearance between the left flap push rod and the left aileron push rod was .354 inch. In the full flap extended position with the cockpit control stick left (full aileron), the clearance between the right flap push rod and the right aileron push rod was .257 inch.

In October 1996, the manufacturer examined a production Air Tractor AT-401 at Olney, Texas, and determined that it was possible to bind the flight controls under the following parameters: down limit microswitch inoperative, jackscrew mechanical stop separated from the shaft, and the flap motor continues to drive the system. With the jackscrew extended 4 2/16 inches the flap push rods touched the aileron push rods. Beyond a 4 2/16 inch extension of the jackscrew the roller balls began to fall out of the assembly. Increasing force was required to move the ailerons, and as the jackscrew was extended to 4 7/16 inches (10 roller balls had fallen out of the jackscrew assembly), the flaps extended in excess of 35 degrees.

The flap actuator assembly was released to the owner's representative.

Pilot Information

Certificate:	Commercial	**Age:**	34, Male
Airplane Rating(s):	Single-engine Land	**Seat Occupied:**	Center
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	04/01/1996
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	3987 hours (Total, all aircraft), 2243 hours (Total, this make and model), 3905 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Air Tractor	**Registration:**	N7314C
Model/Series:	AT-502 AT-502	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Restricted	**Serial Number:**	501-0002
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	01/15/1996, Annual	**Certified Max Gross Wt.:**	6500 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo Prop
Airframe Total Time:		**Engine Manufacturer:**	P&W
ELT:		**Engine Model/Series:**	PT6A-34
Registered Owner:	HARTLEY FLYING SERVICE INC	**Rated Power:**	750 hp
Operator:	HARTLEY FLYING SERVICE INC	**Operating Certificate(s) Held:**	
Operator Does Business As:		**Operator Designator Code:**	KRKG

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Not Reported
Observation Facility, Elevation:	, 0 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	0000	**Direction from Accident Site:**	0°
Lowest Cloud Condition:	Clear / 0 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	None / 0 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	250°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	32°C
Precipitation and Obscuration:			
Departure Point:		**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	
Departure Time:	0000	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	JOYCE M SMITH
Additional Participating Persons:	DAVID STANFILL; LITTLE ROCK, AR
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.