 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: ATL94FA030		Aircraft Registration Number: N9864R	
		Occurrence Date: 12/11/1993		Most Critical Injury: Fatal	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place CHAPEL HILL		State NC	Zip Code 27514	Local Time 1615	Time Zone EST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:			
Aircraft Information Summary					
Aircraft Manufacturer BEECH		Model/Series M35 /M35		Type of Aircraft Airplane	
Revenue Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>*** Note: NTSB investigators either traveled in support of this investigation or conducted a significant amount of investigative work without any travel, and used data obtained from various sources to prepare this aircraft accident report. ***</p> <p>HISTORY OF FLIGHT</p> <p>On December 11, 1993, at 1615 eastern standard time, a Beech M35, N9864R, was substantially damaged following a collision with terrain during an emergency landing near Chapel Hill, North Carolina. The private pilot and both passengers were fatally injured in the accident. The aircraft was being operated under 14 CFR Part 91 by the pilot. Visual meteorological conditions existed at the time, and no flight plan had been filed for the personal flight. The flight departed Chapel Hill, North Carolina, about 1600, and the intended destination was Manteo, North Carolina.</p> <p>After take off from Chapel Hill, the pilot contacted the Raleigh North Carolina Approach Control and reported climbing under visual flight rules. The pilot reported his altitude as 2200 feet above mean sea level. Shortly after contacting the approach control, the pilot reported having engine trouble and stated that he was returning to Chapel Hill, which was west of his position. He later stated that he could not make the Chapel Hill Airport, and was landing in a field.</p> <p>The aircraft impacted the ground in a wooded area, just off the western edge of a large corn field. The aircraft fuselage was nearly consumed by a post crash fire.</p> <p>PERSONNEL INFORMATION</p> <p>Mr. Bertschinger held a private pilot certificate with airplane single engine land rating. He held a third class medical certificate issued on June 6, 1991.</p> <p>No pilot log books could be located for Mr. Bertschinger. Mr. Bertschinger's medical application, dated June 6, 1991, listed his total flight time as 280 hours.</p> <p>Additional personnel information may be obtained on page 3 of this report under section titled Pilot Information.</p> <p>AIRCRAFT INFORMATION</p> <p>The Beechcraft Bonanza Model M35 is a four place, single engine airplane. It is powered by a Continental Motors IO-470-C, 250 horsepower engine.</p> <p>Neither the aircraft nor engine log books could be located.</p>					
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Beech Aircraft records showed a warranty claim, dated in 1987, which listed the aircraft total time, at that time, as 2529 hours.

Additional aircraft information may be obtained on Page 2 of this report under section titled Aircraft Information.

METEOROLOGICAL INFORMATION

Visual meteorological conditions existed at the time of the accident.

Witnesses stated that during the night prior to the accident, there had been numerous periods of heavy rain in the area.

Additional meteorological information may be obtained on page 3 of this report under section titled Weather Information.

WRECKAGE INFORMATION

The aircraft impacted the terrain in a wooded area, just west of the western edge of a large field. The aircraft fuselage was nearly consumed by the post crash fire. There were trees and bushes closely surrounding the impact area. The trees and bushes were not disturbed during the impact. The aircraft fuselage came to rest on a magnetic heading of 258 degrees.

The airplane wings and empennage were still attached to the fuselage. The main and auxiliary fuel tank caps were in place, and appeared in good condition. The fuselage was broken just aft of the cabin rear bulkhead. All flight control surfaces were still attached to their respective attach points on the airframe. There was continuity of the flight control cables into the aircraft cabin area.

The aircraft landing gear was found in the extended position, and the flaps were in the retracted position.

The aircraft propeller was broken away from the attaching flange of the engine and partially buried in the soil. The propeller blades did not exhibit any signs of chordwise scratching or twisting toward low pitch.

Both magnetos produced strong sparks, and there was fuel located in the fuel distributor valve. The spark plugs appeared dry and had minimum carbon buildup.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of Mr. Bertschinger was performed by Dr. Flannagan of the North Carolina Office of Chief Medical Examiner in Chapel Hill, North Carolina.

A toxicological examination of Mr. Bertschinger was performed by the Federal Aviation Administration Toxicology and Accident Research Laboratory in Oklahoma City, Oklahoma.

TEST AND RESEARCH

A detailed examination of the aircraft engine was performed on February 18, 1994, and February 28, 1994, at the facilities of Continental Motors in Mobile, Alabama. (See Report of Examination from Federal Aviation Administration Inspector attached to this report.) The Federal Aviation Administration Inspector reported the following:

External examination of the engine revealed that the engine had received impact and fire damage during the accident. Approximately one third of the propeller flange was broken away. The head of the propeller governor was broken off. The intake balance tube was crushed up and aft. The number 1-2-3-4 and 6 cylinder tubes were ruptured.

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Both left and right side exhaust tubes were crushed upwards. The throttle body and mixture control were broken off. The oil sump was crushed upward. The alternator and hoses on the rear of the engine were burned. The aft fins on number one cylinder were crushed.

Examination of the external engine accessories revealed that the fuel pump was free to rotate, however, the fuel pressure relief valve adjusting screw on the rear of the pump housing was bent. The engine oil pump cavity was scratched, however, the gears exhibited normal polishing signatures.

When the engine oil sump was removed, it was found to have pieces of metal debris located in the sump.

During the disassembly, it was found that the dowel section of the crankcase through bolts and the crankcase parting surfaces were covered with a gray sealing compound. According to the Federal Aviation Administration Inspector, this compound is not approved for use on the Continental engine. He stated that the compound had been applied thick enough to prevent the crankcase parting surfaces from contacting one another.


The crankshaft was broken at the number two crankcheek. It was examined by Continental metallurgist, Mr. Paust, who determined the fracture was of surface origin initiating on the rear side of the number two crankcheek at the lower side of the number one connecting rod journal. The forward edge of the number one connecting rod exhibited rubbing signatures where it had contacted the crankshaft. The fracture had progressed from the origin across the number two crankcheek, and into the counterweight bushing bore. The bushing broke up, and the corner of the counterweight hanger broke off. The number four connecting rod also exhibited rub signatures where it had been contacting the crankshaft connecting rod journal. The accessory drive idler gear pivot had failed in overload, which probably occurred after the crankshaft separated.

The inspector stated that when the pistons were examined, polishing signatures on the number one piston pin bore indicated the pin had been moving in the piston and not in the connecting rod bushing. When the connecting rod was placed on a fixture used to check the fit of the connecting rod bushing to the piston pin, it would not fit, indicating the inside diameter of the bushing was too small.

The piston pin bushings and piston pins were checked for diameter with the following measurements recorded:

Connecting Dia.	Piston Pin Loose	Piston Pin	Clearance Rod Number	Bushing Dia.
1	1.1247	1.1241	.0006	
2	1.1262	1.1242	.0020	
3	1.1252	1.1240	.0012	
4	1.1254	1.1241	.0013	
5	1.1247	1.1241	.0006	
6	1.1249	1.1242	.0007	

The Continental Overhaul Manual for the IO-470-C model engine, part number X30588A, dated August, 1992, calls out the loose clearance for the piston pin in the connecting rod bushing as .0022 to .0026 inch loose.

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The inspector stated that the engine appeared to have been overhauled in the field as evidenced by the unapproved sealant and the incorrect installation of the cotter pins on the connecting rod bolts. He stated that the quality of the overhaul was questionable.

It was the conclusion of the inspector that the only factor found that may have caused the rod rub on the crankshaft cheek, resulting in the fracture and breakage of the crankshaft, was the tight fit of the piston pins to the connecting rod bushings.

ADDITIONAL INFORMATION

The aircraft wreckage was released to Captain Bowles of the University of North Carolina Police Department on December 12, 1993.

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Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used 0	Runway Length	Runway Width
Runway Surface Type:					
Runway Surface Condition:					
Approach/Arrival Flown: NONE					
VFR Approach/Landing: Forced Landing					
Aircraft Information					
Aircraft Manufacturer BEECH		Model/Series M35 /M35		Serial Number D-6413	
Airworthiness Certificate(s): Normal					
Landing Gear Type: Retractable - Tricycle					
Amateur Built Acft? No	Number of Seats: 4	Certified Max Gross Wt.	2950 LBS	Number of Engines: 1	
Engine Type: Reciprocating	Engine Manufacturer: CONTINENTAL	Model/Series: IO-470-C	Rated Power: 250 HP		
- Aircraft Inspection Information					
Type of Last Inspection Unknown	Date of Last Inspection	Time Since Last Inspection Hours	Airframe Total Time Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?/Type	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner BERTSCHINGER, GREGORY A.		Street Address RT. 1 BOX 230			
		City WOODSTOCK	State VA	Zip Code 22664	
Operator of Aircraft BERTSCHINGER, GREGORY A.		Street Address RT. 1 BOX 230			
		City WOODSTOCK	State VA	Zip Code 22664	
Operator Does Business As:			Operator Designator Code:		
- Type of U.S. Certificate(s) Held: None					
Air Carrier Operating Certificate(s):					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 91: General Aviation					
Type of Flight Operation Conducted: Personal					

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First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 43
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Sex: M	Seat Occupied: Left	Occupational Pilot? Business	Certificate Number: On File
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Certificate(s): Private

Airplane Rating(s): Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): None

Instructor Rating(s): None

Current Biennial Flight Review?

Medical Cert.: Class 3	Medical Cert. Status: Expired	Date of Last Medical Exam: 06/1991
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	280									
Pilot In Command(PIC)										
Instructor										
Instruction Received										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

Seatbelt Used? Unknown	Shoulder Harness Used? Unknown	Toxicology Performed? Yes	Second Pilot? No
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Flight Plan/Itinerary

Type of Flight Plan Filed: None

Departure Point Same as Accident/Incident Location	State	Airport Identifier	Departure Time 1600	Time Zone EST
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Destination MANTEO	State NC	Airport Identifier MQI	
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Type of Clearance: None

Type of Airspace: Class G

Weather Information

UAT/CS Source of Wx Information:
Flight Service Station

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Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
RDU	1350	EST	437 Ft. MSL	14 NM	90 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			5500 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Broken		9000 Ft. AGL	Visibility: 15	SM	Altimeter: 29.00 "Hg
Temperature: 3 °C	Dew Point: -11 °C	Weather Conditions at Accident Site: Visual Conditions			
Wind Direction: 310	Wind Speed: 18	Wind Gusts: 26			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0	SM			
Precip and/or Obscuration:					

Accident Information		
Aircraft Damage: Destroyed	Aircraft Fire: Ground	Aircraft Explosion: None

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot	1				1
Second Pilot					
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers	2				2
- TOTAL ABOARD -	3				3
Other Ground	0	0	0		0
- GRAND TOTAL -	3	0	0		3

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Administrative Information

Investigator-In-Charge (IIC)

ROFF H. SASSER,

Additional Persons Participating in This Accident/Incident Investigation:

ROBERT BLAKE
RALEIGH, NC

JOHN V MOELLER
MOBILE, AL