Aviation Investigation Final Report

Location:	SLOATSBURG, New York	**Accident Number:**	NYC00LA270
Date & Time:	August 13, 2000, 18:20 Local	**Registration:**	N100XH
Aircraft:	Beech A36	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation		

Analysis

The pilot reported that while flying in IMC, he was having difficulty with the autopilot. Specifically, he was having problems holding assigned headings, and engaging the autopilot. The airplane then began a rapid descent, but the pilot was able to recover once in VMC. Prior to the accident flight, the pilot experienced difficulty with another airplane. In that airplane, with a different model autopilot, he lost control while landing. According to representatives from the airplane and autopilot manufacturers, the pilot and owner complained about autopilot problems in the past. However, on at least two occasions prior to the accident flight, the owner or pilot of the airplane had been operating the autopilot while the airplane was outside the specifications for safe autopilot operation. Prior to the accident, three separate test flights did not reveal any malfunctions. After the accident, the pilot stated that he might have departed with the autopilot in the slaved nav heading disengaged mode. Subsequently, data retrieved from the autopilot did not indicate any malfunctions.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain aircraft control. A factor was the pilot's diverted attention.

Findings

Occurrence #1: ALTITUDE DEVIATION,UNCONTROLLED
Phase of Operation: CRUISE

Findings
1. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
2. (F) DIVERTED ATTENTION - PILOT IN COMMAND

Factual Information

On August 13, 2000, about 1820 Eastern Daylight Time, a Beech A36, N100XH, was substantially damaged while recovering from an uncontrolled altitude deviation near Sloatsburg, New York. The certificated airline transport pilot was not injured. Instrument meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the flight that departed Teterboro Airport (TEB), Teterboro, New Jersey; destined for Dillant-Hopkins Airport (EEN), Keene, New Hampshire. The business flight was conducted under 14 CFR Part 91.

The pilot stated that the airplane owner held a student pilot certificate, so the pilot accompanied the owner on most flights. The pilot and owner flew to TEB earlier that day, and the owner stayed to attend a business meeting. The pilot was ferrying the airplane back to EEN, and was in instrument meteorological conditions near the BREZY intersection at 6,000 feet. The pilot was having problems with the autopilot, and the airplane "kept wanting to climb" when the autopilot was on or off. On at least three occasions, the pilot attempted to activate and deactivate the autopilot. Additionally, he was having difficulty holding assigned courses with the "slaved gyro".

The pilot eventually disengaged the autopilot, but was not sure that it was off. He added:

"All of a sudden aircraft was in a steep dive, no spiral, no spatial disorientation, I went from 6000 to 2000 at the snap of my finger. I came out of the overcast at 2000 in a dive of [90 degrees], I was looking at a yellow house with a swimming pool in the backyard."

The pilot was able to recover from the dive using ground references, and during the recovery, he overstressed the wings of the airplane. He canceled his IFR flight plan, and continued uneventfully to EEN.

Examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed that both wings were bent and buckled.

The pilot stated that prior to this accident, he had another problem with an autopilot. In a different airplane, with a different autopilot engaged, he lost control of the airplane while on approach to TEB.

On September 9, 1999, the owner took delivery of the accident airplane. The owner stated that on September 10, 1999, he and the pilot attempted to takeoff with the autopilot engaged. He complained, to the airplane and autopilot manufacturers, that the airplane "wanted to takeoff" at 30 knots. The owner added that he disengaged the autopilot, completed the takeoff, and then re-engaged the autopilot. However, with the autopilot re-engaged, and the engine at full

power, the airplane would not exceed 125 knots. The owner further stated that the elevator trim was stuck in the 18-degree nose-up position. The airplane and autopilot manufacturers cautioned the owner that takeoff with the autopilot engaged was expressly prohibited.

According to the airplane manufacturer, in the situation the owner described, the airplane would not be controllable with a full nose-up trim setting. Prior testing by the airplane manufacturer revealed that the airplane was marginally controllable with a 12-degree nose-up trim setting. Additionally, the autopilot provided a voice warning if it was excessively trimming. The manufacturers added that the elevator trim would travel nose-up during three situations:

1. Attempted takeoff with the autopilot engaged. 2. Pushing the yoke forward while the altitude hold feature of the autopilot was engaged. 3. Reducing power while the altitude hold feature of the autopilot is engaged

The owner stated that during a subsequent flight in December 1999, with the autopilot engaged, he attempted a 360-degree turn. After disengaging the autopilot, the trim was stuck in an 18-degree nose-up setting.

Both manufacturers stated that subsequent conversations with the owner revealed that he was attempting the turn at 65 knots. Operation of the autopilot below 85 knots was expressly prohibited. Additionally, if the altitude hold was engaged at that speed, the autopilot would trim nose-up to maintain altitude.

The owner stated that on December 5, 1999, he depressed the control-wheel-steering switch (CWS) on the yoke in an attempt to momentarily descend from 4,500 feet to 4,000 feet. He complained that the airplane did not return to 4,500 feet after he released the CWS.

The manufacturers stated that autopilot was not designed to return the airplane to the original altitude after depressing and releasing the control-wheel-steering switch. Therefore, the autopilot performed normally.

The owner stated that after December 1999, three of the four autopilot servos were replaced per a FAA Airworthiness Directive (AD). The AD required the servos to meet certain torque specifications. After the three "defective" servos were replaced, he did not experience any problems with the autopilot.

The manufacturers stated that the servos functioned normally, but did not meet the required torque specifications.

After the accident, according to the airplane manufacturer, the pilot stated that the airplane owner "liked to push buttons." The pilot thought that the owner might have disengaged the slaved gyroscope during the flight to TEB, just prior to the accident flight.

The manufacturers stated that takeoff with the "slave nav heading disengaged" would limit the

capabilities of the autopilot. The autopilot would not have been able to fly a specific heading; it would have acted like a basic "wing-leveler."

From the date of delivery, until the accident flight, the airplane was test flown on three separate occasions. The first test flight was conducted by representatives from the airplane and autopilot manufacturers. The subsequent test flights were conducted by representatives of the airplane manufacturer. No deficiencies were found with the autopilot during the three test flights.

After the accident flight, a representative from the autopilot manufacturer download data from the autopilot. According to the autopilot manufacturer, the accident flight resulted in four error codes. Error code 172 indicated manual electric trim fail. The airplane yoke was equipped with a split trim switch. If one-half of the switch was depressed for more than 3 seconds, the error code would have been generated. The error code was generated 6 minutes and 52 seconds after initial power up. The manufacturer representatives stated that the pilot probably tested the electric trim on the ground, as required by the pre-takeoff checklist.

Error codes 144 and 165 indicated vertical coupled invalid and altitude arm denied, respectively. The manufacturer representatives stated that the codes would have been generated if the airplane was subjected to more than plus or minus 3 g's for a period of .5 seconds or more. The representatives added that the recovery from the dive was most likely the cause of the two codes being generated.

Error code 141 indicated lateral couple invalid. The manufacturer representatives stated that if the compass slaving was in the free gyro mode instead of the slaved mode, as the pilot reported, the code would be generated.

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	76,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Glider	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Glider; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	July 1, 1999
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	22445 hours (Total, all aircraft), 1100 hours (Total, this make and model), 22000 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N100XH
Model/Series:	A36 A36	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	E3249
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	September 9, 1999 Annual	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:	141 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	141 Hrs	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-550
Registered Owner:	MONTAGE AVIATION CORP.	**Rated Power:**	310 Horsepower
Operator:	SIMON V. HABERMAND	**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TEB ,9 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	17:51 Local	**Direction from Accident Site:**	180°
Lowest Cloud Condition:	Scattered / 2700 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 3600 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	50°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	20°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	TETERBORO , NJ (TEB)	**Type of Flight Plan Filed:**	IFR
Destination:	KEENE , NH (EEN)	**Type of Clearance:**	IFR
Departure Time:	18:00 Local	**Type of Airspace:**	Class E

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	41.160598,-74.189453(est)

Administrative Information

Investigator In Charge (IIC):	Gretz, Robert
Additional Participating Persons:	GARY READIO; PORTLAND , ME
Original Publish Date:	May 8, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=51287