Aviation Investigation Final Report

Location:	TRENTON, New Jersey	**Accident Number:**	NYC01LA057
Date & Time:	December 9, 2000, 11:00 Local	**Registration:**	N201MP
Aircraft:	Mooney M-20J	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

With a fight instructor, the pilot executed a normal takeoff from Runway 34 for right closed traffic. Because a UH-60 helicopter was executing an approach from the southwest to the threshold of Runway 34, the pilot extend the touchdown point by 1,000 feet. The helicopter transitioned to hovering flight near the threshold, about 30 seconds before the accident airplane. After a short delay, the UH-60 air-taxied to the ramp. When the accident airplane was about 20 feet above the ground, it suddenly rolled right, (faster than a full application of aileron could counteract,) and the right wing contacted the ground. Witness statements place the UH-60, 100 to 600 feet away from the accident airplane at the time of the accident. According to the Aeronautical Information Manual, every aircraft generates vortices, that can cause an uncommanded roll that exceeds the roll-control authority of the encountering airplane. Landing helicopters produce a pair of strong, high-speed trailing vortices similar to larger fixed wing aircraft. Pilots of small aircraft should use caution when operating behind landing helicopters.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The flight instructor's improper decision to allow his student to land in close proximity to a hovering helicopter.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH - VFR PATTERN - FINAL APPROACH

Findings
1. WAKE TURBULENCE - ENCOUNTERED
2. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND(CFI)

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
3. TERRAIN CONDITION - RUNWAY

Factual Information

On December 9, 2000, about 1100 Eastern Standard Time, a Mooney M-20J, N201MP, was substantially damaged while landing at the Trenton Mercer Airport (TTN), Trenton, New Jersey. The certificated private pilot and flight instructor were not injured. Visual meteorological conditions prevailed, and no flight plan was filed for the local training flight conducted under 14 CFR Part 91.

According to the flight instructor, the pilot executed a normal takeoff from Runway 34 for right closed traffic. The pilot flew the downwind at 1,200 feet, completed the base leg portion of the traffic pattern, and then turned final about a 1/2 mile from the landing threshold and 700 feet msl. Because a UH-60 helicopter was executing an approach from the southwest to the threshold of Runway 34, the flight instructor advised the pilot to extend the touchdown point by 1,000 feet. The helicopter transitioned to hovering flight near the threshold, about 30 seconds ahead of the accident airplane. Due to another airplane holding short of Runway 34 on taxiway "echo," the UH-60 had to air-taxi to another section of the taxiway.

The accident airplane was approximately 20 feet above the ground with landing flaps and 90 mph, and the UH-60 was hovering 100 feet to the north, when the accident airplane suddenly rolled right (faster than a full application of aileron could counteract.) The pilot and flight instructor simultaneously applied full left aileron, and the flight instructor applied full power. The right wing contacted the ground and the nose of the airplane rotated 90 degrees to the right. The flight instructor then closed the throttle and the airplane impacted the runway landing gear first. The airplane came to rest upright on its landing gear.

This was the third flight the flight instructor conducted with the pilot in the accident airplane. The flight instructor added that the pilot did a good job of listening and executing instructions. In addition, the flight instructor had approximately 3,300 hours of total flight experience, with 500 hours of that in make and model. Include in that time was 300 hours of flight instruction.

According to a witness approximately 680 feet to the northeast of the accident site, the helicopter was hovering over taxiway "echo," when he noticed a low-wing airplane on a right base for Runway 34. The bank angle for the airplane was more than 40 degrees, and the airplane appeared to be low. The witness than lost sight of the airplane as it passed behind a building. At the time of the accident, the helicopter was transitioning to the ramp, located approximately 600 from the accident site.

According to the Aeronautical Information Manual, every aircraft generates rotating vortices that trail from their wing tips. The vortices from larger aircraft pose problems to encountering aircraft. For instance, the wake of an aircraft can impose rolling moments exceeding the roll-control authority of the encountering aircraft. Further, turbulence generated within the vortices

can damage aircraft components and equipment if encountered at close range. The pilot must learn to envision the location of the vortexes generated by larger aircraft, and adjust the flight path accordingly.

A crosswind will decrease the lateral movement of the upwind vortex and increase the movement of the downwind vortex. Thus a light wind with a cross runway component of 1 to 5 knots could result in the upwind vortex remaining in the touchdown zone for a period of time and hasten the drift of the downwind vortex toward another runway.

A helicopter in a slow hover taxi or stationary hover near the surface, generates downwash producing high velocity outwash vortices to a distance approximately three times the diameter of the rotor. When rotor downwash hits the surface, the resulting outwash vortices have behavioral characteristics similar to wing tip vortices produced by fixed wing aircraft. However, the vortex circulation is outward, upward, around, and away from the main rotor(s) in all directions. Pilots of small aircraft should avoid operating within three rotor diameters of any helicopter in a slow hover taxi or stationary hover. In forward flight, departing or landing helicopters produce a pair of strong, high-speed trailing vortices similar to wing tip vortices of larger fixed wing aircraft. Pilots of small aircraft should use caution when operating behind or crossing behind landing and departing helicopters.

About 7 minutes before the accident, Trenton reported wind 320 degrees at 10 knots, visibility 10 miles, clear skies, temperature 34 degrees Fahrenheit, dew point 16 degrees Fahrenheit, and an altimeter setting of 30.40 inches of mercury.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	31,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	September 19, 2000
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	3300 hours (Total, all aircraft), 500 hours (Total, this make and model), 3000 hours (Pilot In Command, all aircraft), 150 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N201MP
Model/Series:	M-20J M-20J	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-0072
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	Annual	**Certified Max Gross Wt.:**	2740 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	IO-360
Registered Owner:	ROBERT KEEFER	**Rated Power:**	200 Horsepower
Operator:		**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:	TTN ,213 ft msl	**Distance from Accident Site:**	
Observation Time:	10:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	320°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	1°C / -9°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	TRENTON , NJ (TTN)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	10:45 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	TRENTON MERCER TTN	**Runway Surface Type:**	Asphalt
Airport Elevation:	213 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	34	**IFR Approach:**	None
Runway Length/Width:	4800 ft / 150 ft	**VFR Approach/Landing:**	Full stop;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	Muzio, David
Additional Participating Persons:	EDWARD BOWER; PHILADELPHIA , PA
Original Publish Date:	July 2, 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=50768