Aviation Investigation Final Report

Location:	Baltimore, Maryland	**Incident Number:**	ERA12IA166
Date & Time:	January 30, 2012, 18:43 Local	**Registration:**	N272CB
Aircraft:	Gulfstream G150	**Aircraft Damage:**	Minor
Defining Event:	Landing area overshoot	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

The airplane was approaching the destination airport in night visual meteorological conditions. The pilot-in-command (PIC) was the pilot flying and was not familiar with the destination airport. The second-in-command (SIC) was the pilot monitoring and was familiar with the destination airport. While the airplane was at 2,000 feet mean sea level, about 10 miles from the airport, the PIC did not see the airport; however, the SIC observed the airport beacon, but not runway 33R. The controller then offered either a clearance for a visual approach to runway 33R or a vector for the runway 33R instrument landing system (ILS) approach. The PIC indicated to the SIC that he wanted the ILS; however, the SIC stated that he saw runway 33R and asked the PIC if he saw it, to which he replied no. The SIC then told the controller that they had the runway in sight. The PIC subsequently stated to the SIC that he saw runway 33R, but he confused it with runway 28.

About 2 minutes later, with the SIC assisting, the PIC visually acquired the correct runway. At that time, the airplane was about 6 miles from the runway, at 1,400 feet msl. The airplane made a left turn, followed by a right turn, which positioned it from a final approach to runway 28, to a final approach to runway 33R. The airplane was lined-up for runway 33R about 4 miles from the runway threshold, at 1,000 feet and 145 knots groundspeed. While on short final approach, about 300 feet agl, the airspeed went below the landing reference speed (Vref) by about 3 to 5 knots. The SIC responded by emphasizing "below Vref" two times, followed by "power" four times. The PIC added power and the airplane's speed went above Vref by about 10 knots.

The airplane touched down about halfway down the 5,000 foot-long runway, about 140 knots

groundspeed with an approximate 5-knot tailwind. Although the flight crew did not believe the thrust reversers activated, non-volatile memory (NVM) of the engine controls revealed that they deployed for 13 seconds; however, the airplane still traveled off the end of the runway and came to rest in mud about 200 feet from the departure end. Examination of the airplane and its other NVM did not reveal any preimpact mechanical malfunctions. The flight crew did not report any additional anomalies, including the breaking system, and 226 feet of pulsing skid marks were identified near the departure end of the runway.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: The pilot-in-command's failure to obtain the proper touchdown point or landing reference speed and failure to initiate a go-around when it became evident that the airplane was landing long and fast. Contributing to the incident was a lack of effective flight crew coordination and communication.

Findings

Aircraft	Descent/approach/glide path - Not attained/maintained
Aircraft	Airspeed - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Personnel issues	Lack of action - Pilot
Personnel issues	(general) - Flight crew

Factual Information

History of Flight

Landing-flare/touchdown	Landing area overshoot (Defining event)
Landing-landing roll	Runway excursion
Landing-landing roll	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On January 30, 2012, at 1843 eastern standard time, a Gulfstream G150, N272CB, operated by Chattem Inc., sustained minor damage during a landing overrun at Baltimore Washington International Airport (BWI), Baltimore, Maryland. The two certificated airline transport pilots were not injured. The corporate repositioning flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Night visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the flight that departed from Pocono Mountains Municipal Airport (MPO), Mount Pocono, Pennsylvania, at 1808.

According to their written statements, the pilot-in-command (PIC) was the pilot flying and the second-in-command (SIC) was the pilot monitoring. The PIC stated that they obtained the current BWI automated terminal information system (ATIS) report, which stated that visual approaches were being conducted to runways 33L and 33R. The flight crew reported the airport in sight to Baltimore Approach and were cleared for a visual approach to runway 33R. While established on the approach, the PIC viewed the precision approach path indicator and listened to the enhanced ground proximity warning system (EGPWS) report altitudes. He adjusted engine power to remain on glideslope and recalled that the airspeed was about 5 or 6 knots above the landing reference speed (Vref) of 129 knots. The PIC continued with engine power and attitude adjustments. He then proceeded with a routine landing on the main landing gear. As the PIC lowered the nosegear he raised the thrust reverser handles; however, there was no feeling of deceleration or sound of engine power change. While maintaining directional control and braking with rudder pedals, the PIC reached again with both hands to initiate thrust reverser controls, but the thrust reversers did not respond. He stated to the SIC that the thrust reversers did not deploy and continued with heavy braking as the airplane traveled off the end of the 5,000-foot runway.

The SIC added that during the approach, he saw the airport beacon and then the runway 33R lights. At that time, the flight was cleared by air traffic control (ATC) for a visual approach. The PIC initially mistook runway 28 for runway 33R, but the SIC used a chart on the multifunction display to assist the PIC in orienting to the correct runway. The SIC then noticed that the airplane was "a little slow" on final approach, and advised the PIC to watch the speed. The PIC then proceeded to correct the airspeed and it went "somewhat above" Vref. The SIC added that when the airplane touched down, he was concerned (about the runway length remaining) and

the PIC appeared to be struggling to activate the thrust reversers. Toward the end of the runway, the SIC assisted the PIC with braking; however, the airplane overran the runway and came to rest in mud.

PERSONNEL INFORMATION

The PIC, age 61, held an airline transport pilot certificate, with ratings for airplane single-engine land and airplane multiengine land. He held a commercial pilot certificate, with a rating for airplane single-engine sea. He also held a mechanic certificate, flight instructor certificate, and type ratings in the Gulfstream 150 and Cessna 650. His most recent Federal Aviation Administration (FAA) first-class medical certificate was issued on February 16, 2011. The PIC reported a total flight experience of 12,604 hours; of which 109 hours were in the same make and model as the incident airplane. He flew 58 hours and 31 hours in the Gulfstream 150 during the 90-day and 30-day periods preceding the incident, respectively.

The SIC, age 49, held an airline transport pilot certificate, with a rating for airplane multiengine land. He held a commercial pilot certificate, with a rating for airplane single-engine land. He also held type ratings in the Boeing 737, Cessna 650, and Gulfstream 150. The SIC's most recent FAA first-class medical certificate was issued on July 11, 2011. The SIC reported a total flight experience of 13,633 hours; of which, 120 hours were in the same make and model as the incident airplane. He flew 60 hours and 31 hours in the Gulfstream 150 during the 90-day and 30-day periods preceding the incident, respectively.

AIRCRAFT INFORMATION

The 9-seat airplane, serial number 0262, was manufactured in 2008. It was powered by two Honeywell TFE 731-40AR-200G engines, each capable of generating 4,250 pounds of thrust. The airplane was maintained under a manufacturer's approved inspection program. The airplane's most recent inspection was completed July 18, 2011. At the time of the incident, the airframe and engines had accrued 494 total hours of operation.

METEOROLOGICAL INFORMATION

The airport elevation at BWI was 146 feet. The recorded weather at BWI, at 1850, was: wind from 140 degrees at 4 knots; visibility 10 miles; few clouds at 10,000 feet; broken ceiling at 25,000 feet; temperature 4 degrees C; dew point minus 11 degrees C; altimeter 30.30 inches Hg.

According to the U.S. Naval Observatory, Sun and Moon Data, sunset occurred at 1724 and the end of civil twilight at 1753.

FLIGHT RECORDERS

A cockpit voice recorder (CVR), EGPWS, anti-skid computer, maintenance diagnostic computer

(MDC), and two digital electronic engine control systems (DEECs) were retained by the NTSB and forwarded to the NTSB Vehicle Recorders Laboratory, Washington, D.C., for data download.

CVR

A CVR Group was convened at the NTSB Vehicle Recorders Laboratory, Washington, D.C. Data was successfully downloaded and a transcript was prepared of approximately the last 22 minutes of the recording.

At 1828, the airplane was at 12,000 feet mean sea level (msl) and the flight crew was in radio contact with Baltimore Approach. The SIC advised the controller that he had ATIS information victor. The controller instructed the flight to expect a visual approach to runway 33L, which the SIC acknowledged.

At 1830, the SIC requested runway 33R, which the controller acknowledged and advised the flight to descend to 4,000 feet.

At 1832, the SIC noted that they were 27 miles from the airport.

At 1833, Potomac Approach instructed the flight to proceed direct BWI and maintain 3,000 feet, which the SIC acknowledged.

At 1836, while receiving descent vectors, the controller instructed the flight to descend to 2,000 feet, which the SIC acknowledged. The SIC also selected the ORIOL intersection on the flight management system.

At 1838, when the airplane was at 2,000 feet, the controller advised that the airport was at 2 o'clock and 10 miles. The PIC remarked to the SIC that he did not see it and was unfamiliar with the airport. The SIC reported to the controller that they saw the airport beacon, but had not yet seen the runway. The controller then offered either a clearance for a visual approach to runway 33R, a vector for the runway 33R instrument landing system approach, or a different approach. The PIC stated yes to the SIC; however, the SIC stated that he saw the runway and asked the PIC if he saw it, which he replied no. The SIC then told the controller that they had the runway in sight and the PIC subsequently told the SIC he now saw it. The controller cleared the flight for a visual approach to runway 33R, with an instruction to switch to the tower radio frequency, which the SIC acknowledged.

At 1839, the tower controller cleared the flight to land on runway 33R and provided wind information, which was from 160 degrees at 5 knots. The PIC asked the SIC if what he saw was the runway. The PIC added that he was not looking at the correct runway. The SIC then acknowledged the landing clearance to air traffic control and continued to assist the PIC in visually acquiring runway 33R.

At 1840, the PIC stated to the SIC that he saw the correct runway. He asked him for 20-degrees of flap extension, to extend the landing gear, and to remove the 2,000-foot altitude bug, which the SIC completed. The EGPWS then noted that they were descending through 1,000 feet.

At 1842:12, the EPGWS noted that the airplane was descending through 500 feet. The PIC asked the SIC for full flap extension, which the SIC acknowledged.

At 1842:29, the EGPWS noted that the airplane was descending through 300 feet. The SIC then stated, "…you're below rev (ref). below rev. power. power. power. power. you're one twenty nine rev remember."

At 1842:37, while descending through 200 feet, the SIC remarked, "there you go, you're rev and about three."

At 1842:46, the EGPWS noted 50, 40, 30, 20, and then 10 feet.

At 1842:56, a sound was recorded similar to a rattle of the landing gear handle solenoid, consistent with weight on wheels.

At 1842:58, a sound was recorded consistent with deceleration

At 1842:59, the SIC remarked that there was 2,000 feet of runway remaining.

At 1843:02, the PIC remarked that he could not get the thrust reversers to come up.

At 1843:06, the PIC remarked that the thrust reversers were not on.

At 1843:08, the SIC stated that they were going off the end.

EGPWS

Download of the EGPWS revealed that one data point was capture during the approach, which occurred at the 50-foot altitude. The data point revealed that the airplane was over the runway numbers at a global positioning system altitude of 168 feet.

Anti-skid Computer

Review of the anti-skid computer revealed that it did not contain non-volatile memory.

MDC

Download of the MDC did not reveal any faults during the approach, landing, and rollout on the runway during the incident flight. Two faults were generated after the airplane departed the end of runway 33R. The faults were for the radio altimeter and the stall warning system.

DEECs

Review of downloaded data from the DEECs revealed that during the incident landing, the thrust reversers deployed for approximately 13 seconds. During that time, the engine power increased to about 50 percent.

WRECKAGE AND IMPACT INFORMATION

An FAA inspector responded to the site and observed the airplane resting in mud, approximately 200 feet beyond the departure end of the 5,000-foot runway. He measured 226 feet of pulsing skid marks at the end of the runway. The damage to the airplane was limited to two of the four nosegear doors and the nosegear had separated about 6 inches above the strut.

Following the overrun, the FAA inspector witnessed Gulfstream technicians test the airplane. Specifically, they applied power and did not observe any fault codes or problems with the brakes. The technicians then deployed and stowed the thrust reversers several times without incident. Subsequently, the airplane was ferried uneventfully to Savannah, Georgia, for further repair.

AIR TRAFFIC CONTROL

Review of radar data revealed that at 1839:53, the airplane was approximately 7 miles from the airport, at 1,700 feet msl and 170 knots groundspeed, on the extended centerline for runway 28. The airplane then made a slight left turn, followed by a right turn at 1841:07, to line up with runway 33R. At that time, the airplane was about 4 miles from the airport, at 1,000 feet and 145 knots. At 1841:58, the airplane was on the extended centerline for runway 33R. At that time, the airplane was approximately 2 miles from the runway threshold, at 700 feet, and 139 knots.

At 1842:21, the airplane was approximately 1 mile from the runway 33R threshold, at 400 feet msl and 146 knots groundspeed. At 1842:43, the airplane was over the runway threshold at approximately 100 feet, at 138 knots. The last radar target was recorded at 1842:48, indicating a location of about 1,000 feet beyond the approach end of runway 33R, at 0 feet and 140 knots.

ADDITIONAL INFORMATION

Landing Distance

According to a representative from the airplane manufacturer, at an estimated landing weight of 21,480 pounds, the airplane (operating under Part 91) required a landing distance of approximately 2,861 feet on a dry runway, without wind factored. The distance also assumed the Vref speed of 129 knots, BWI airport elevation, a standard temperature of 15 degrees C,

and no use of thrust reversers.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	61,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	February 16, 2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 18, 2011
Flight Time:	12604 hours (Total, all aircraft), 109 hours (Total, this make and model), 10306 hours (Pilot In Command, all aircraft), 58 hours (Last 90 days, all aircraft), 31 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport; Commercial	**Age:**	49,Male
Airplane Rating(s):	Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	July 1, 2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 4, 2011
Flight Time:	13633 hours (Total, all aircraft), 120 hours (Total, this make and model), 5814 hours (Pilot In Command, all aircraft), 61 hours (Last 90 days, all aircraft), 31 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Gulfstream	**Registration:**	N272CB
Model/Series:	G150	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	262
Landing Gear Type:	Retractable - Tricycle	**Seats:**	9
Date/Type of Last Inspection:	July 18, 2011 AAIP	**Certified Max Gross Wt.:**	21100 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:	494 Hrs at time of accident	**Engine Manufacturer:**	Honeywell
ELT:	Installed, not activated	**Engine Model/Series:**	TFE 731-40AR
Registered Owner:	CHATTEM INC	**Rated Power:**	4250 Lbs thrust
Operator:	CHATTEM INC	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	BWI,146 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	18:50 Local	**Direction from Accident Site:**	0°
Lowest Cloud Condition:	Few / 10000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 25000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	140°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.29 inches Hg	**Temperature/Dew Point:**	4°C / -11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Mount Pocono, PA (MPO)	**Type of Flight Plan Filed:**	IFR
Destination:	Baltimore, MD (BWI)	**Type of Clearance:**	IFR
Departure Time:	18:08 Local	**Type of Airspace:**	

Airport Information

Airport:	Baltimore/Washington Internati BWI	**Runway Surface Type:**	Asphalt
Airport Elevation:	146 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	33R	**IFR Approach:**	Visual
Runway Length/Width:	5000 ft / 100 ft	**VFR Approach/Landing:**	Full stop;Straight-in

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Minor
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	39.175277,-76.668334(est)

Administrative Information

Investigator In Charge (IIC):	Gretz, Robert
Additional Participating Persons:	Richard Newton; FAA/FSDO; Baltimore, MD Rick Trusis; Gulfstream Aerospace Corporation; Savanah, GA Barry Roche; Sanofi; Bridgewater, NJ Jim Allen; Honeywell; Phoenix, AZ
Original Publish Date:	October 4, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this incident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=82778