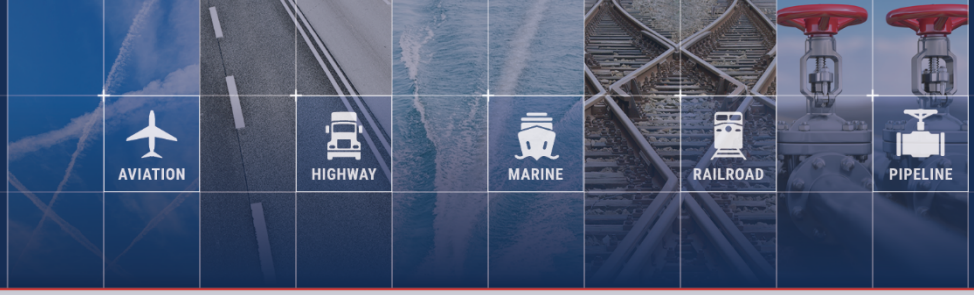

Aviation Investigation Final Report

Location:	Parkton, North Carolina	**Accident Number:**	ERA13FA088
Date & Time:	December 16, 2012, 15:32 Local	**Registration:**	N5714W
Aircraft:	Piper PA-28-160	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The instrument-rated pilot departed with nearly full fuel tanks, obtained his instrument flight rules (IFR) clearance, and proceeded toward the destination airport, which, at the time of the accident, was IFR with a 500-foot ceiling. The pilot was vectored onto final approach for an instrument landing system approach. Radar data showed that the airplane performed s-type turns; the pilot then reported to the local controller that he had "...lost some gyros but I think we are getting it." When the airplane was about 1 mile from the approach end of the runway at 1,300 feet, the local controller cancelled the approach clearance because the airplane was too high and advised the pilot to fly runway heading and climb to 2,000 feet. Radar data indicated that the pilot turned toward an easterly heading without clearance from the controller.

The pilot was then instructed to maintain an easterly heading followed by a southwesterly heading (220 degrees) consistent with a downwind leg to fly parallel to runway 4. The pilot turned well past the southwesterly heading to a northwesterly heading, and was asked by the controller if he was having any problem with the airplane such that he was unable to fly assigned headings. The pilot advised the radar controller that he "...currently [had] no gyro I think the best thing for me to climb a little bit and go to my alternate of ah Columbus or some point south." There was an adequate supply of fuel onboard to fly to his alternate airport, which at that time was under visual meteorological conditions with 10 miles visibility and a ceiling at 5,500 feet. As a result of the loss of gyros, the pilot was flying the airplane with a partial panel. The pilot was cleared to climb direct to his alternate airport; however, extensive heading and altitude deviations were noted during this portion of the flight, which was operating in IMC. The radar controller asked the pilot if he was ok to which he replied, "uh no im not okay right now." This verbiage and the fact that extensive altitude and heading deviations occurred were clear indications that an emergency situation existed; however, the controller did not recognize this and did not request the necessary information needed to offer assistance, as outlined in FAA Order 7110.65, 10-2-1. The controller later reported that he believed the gyro comment would have affected only the pilot's ability to maintain heading, thus, he did not believe the loss of gyros while in instrument conditions constituted an emergency.

The controller then asked the pilot if he wanted to land at the airport, and he answered, "uh the best thing to"; however, the communication was not finished. It is likely that the pilot was intending to tell the controller again that he wanted to go to his alternate airport. However, because the controller did not recognize the emergency, he continued to vector the pilot to land using an ILS approach. While thbeing vectored, when the airplane was operating in IMC, major heading and altitude changes were noted; however, when the airplane was operating at higher altitudes in VFR conditions, the pilot was able to maintain the airplane's assigned heading and altitude. The steady flight in VFR conditions should have been a cue to the controller that safe flight was possible in visual conditions; thus he should have encouraged the pilot to continue the flight to his alternate airport as the pilot had requested.

Instead, the controller vectored the pilot to intercept the localizer, advised that the flight was about 4 miles from the final approach fix, and cleared the pilot to conduct an ILS approach. The pilot managed to fly onto final approach, but while in IMC conditions, rolled to the right and crashed inverted in a wooded area about 7.5 nautical miles from the approach end of the runway. Postaccident examination of the airframe and flights controls for roll, pitch, and yaw revealed no evidence of preimpact failure or malfunction. Examination of the power section of the engine revealed no evidence of preimpact failure or malfunction; one propeller blade exhibited "S"-bending consistent with the engine developing power at impact. No discrepancies were noted with the airport approach systems.

Examination of the engine-driven vacuum pump, which operates the primary flight instruments consisting of the attitude indicator and directional gyro revealed fire damage to the shear shaft; however, no evidence of scoring of the interior surface of the housing was noted. Further, inspection of the gyroscopic flight instruments operated by the engine-driven vacuum pump revealed no evidence of rotational scoring; therefore, the engine-driven vacuum pump, which was about 3 years 4 months beyond the suggested replacement interval, was not operating at the moment of impact. This was consistent with the comment from the pilot that he had lost his gyro instruments.

Although no determination could be made as to whether the pilot was instrument current, his inability to maintain control of the airplane while flying with a partial panel suggests he was not proficient in doing so; he failed this criteria in April 2002 during his first instrument rating checkride.

In August 2004, in response to an NTSB recommendation, the FAA implemented national computer-based training to alert controllers of in-flight emergencies a pilot may encounter and the effect of the emergency. NTSB review of the current version of the CBI revealed it did not contain scenarios related to failures of the vacuum system or gyro flight instruments. Although the training provided to the controllers involved appeared to be inconsistent, it is unlikely that consistent training would have affected the outcome of the accident because specific mention of gyro malfunction was not a covered topic in the CBI training.

Although the pilot had not declared an emergency, he had advised ATC personnel that he had lost his gyros, and that he was "not OK." Further, extensive altitude and heading excursions of the aircraft were noted, all of which were clear indicators that an in-flight emergency existed. Had any of the FAA controller personnel understood either by experience or training that the pilot's declarations or altitude and heading changes constituted an emergency, they could have declared an emergency for the pilot and obtained the necessary information required by section 10-2-1 of FAA Order 7110.65U, "Air Traffic

Control." Had that occurred, it is likely the pilot would have been vectored to an airport with VFR conditions for an uneventful landing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The failure of the instrument-rated pilot to maintain control of the airplane while in instrument meteorological conditions after reporting a gyro malfunction. Contributing to the accident was the loss of primary gyro flight instruments due to the failure of the vacuum pump, the inadequate assistance provided by FAA ATC personnel, and the inadequate recurrent training of FAA ATC personnel in recognizing and responding to in-flight emergency situations.

Findings

Aircraft	Directional control - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Failure
Aircraft	Directional gyro & indication - Failure
Aircraft	Attitude gyro & indication - Failure
Personnel issues	Understanding/comprehension - ATC personnel
Personnel issues	Recurrent instruct/training - ATC personnel

Factual Information

History of Flight

Approach-IFR final approach	Sys/Comp malf/fail (non-power)
Approach-IFR initial approach	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On December 16, 2012, about 1532 eastern standard time, a Piper PA-28-160, N5714W, registered to and operated by a private individual, crashed in a wooded area near Parkton, North Carolina. Instrument meteorological conditions prevailed at the time and an instrument flight rules (IFR) plan was filed for the 14 Code of Federal Regulations (CFR) Part 91 personal flight from Summerville Airport (DYB), Summerville, South Carolina, to Fayetteville Regional Airport/Grannis Field (FAY), Fayetteville, North Carolina. The airplane sustained substantial damage and the private pilot, the sole occupant, was fatally injured. The flight originated from DYB about 1400.

The pilot departed VFR and at 1412, he established contact with Charleston air traffic control tower (ATCT) and was issued a discrete IFR transponder code. About 1 minute later the airplane was radar identified, the pilot was issued IFR clearance, and instructed to climb and maintain 5,000 feet which he acknowledged. While proceeding towards the destination airport, air traffic control (ATC) communications were transferred to Shaw Air Force Base Approach, followed by Fayetteville Approach Control.

According to a transcription of communications with Fayetteville Air Traffic Control Tower, at 1451:41, the pilot established contact with the radar controller of the East Radar position of Fayetteville ATCT, and advised the controller that the flight was at 5,000 feet mean sea level (msl). The radar controller instructed the pilot to advise when he had automated terminal information service (ATIS) Alpha, and to expect instrument landing system (ILS) runway 4 approach, to which he immediately acknowledged having obtained ATIS information Alpha and to expect ILS runway 4 approach. The controller then provided the altimeter setting to the pilot and he read-back correctly the last 2 digits.

At 14:57:20, the radar controller asked the pilot if he could accept direct ZODGI, which is the initial approach fix (IAF) for the ILS to runway 4. While the transcription of communication indicates the pilot's response was unintelligible, NTSB review of the certified voice tape revealed his comment was in the affirmative. The controller issued the pilot a 055 degree heading to join the localizer, and instructed him to report established on the final approach course. The pilot did not respond, so the radar controller repeated the transmission. The pilot apologized and acknowledged the instructions.

At 14:59:41, the radar controller issued the pilot a weather advisory for a small area of moderate precipitation at the pilot's one o'clock position and 3 miles, which he acknowledged. At 1504:38, the radar controller instructed the pilot to descend and maintain 2,300 feet and, "…verify established" on the

localizer. The pilot acknowledged the altitude assignment, and stated, "…couldn't (unintelligible) isn't quite established yet sir." At 1504:51, the pilot asked if a heading of 055 was good to intercept, and the radar controller replied affirmative.

At 1506:07, the controller advised the pilot that the flight was 10 miles from the final approach fix, fly the present heading and to maintain at or above 2,300 feet until established on the localizer, cleared for ILS straight in runway 4 approach. The pilot acknowledged the instructions and advised the controller, "…I think we're established now thanks." Radar data indicates that before reaching ZODGI, the pilot flew slightly east of the final approach course, followed by a left turn flying west of the final approach course. Air traffic control communications were transferred to local control of the FAY ATCT, and at 1507:10, while west of the final approach course but before ZODGI, the pilot established contact with local control and was cleared to land. The local controller also provided the wind direction and velocity information to the pilot but he did not reply. The radar data indicated that as the flight continued towards FAY near ZODGI, the airplane flew in an easterly direction flying east of the final approach course. The airplane was observed on radar turning to the northwest and intercepting the final approach course, then turned again and flew east of the final approach course.

At 1509:43, the radar controller contacted the local controller and advised that the airplane appeared to be right of course; at that time the airplane was east of the final approach course. The radar data indicates that the pilot performed S type turns while remaining right of course and at 1510:34, the local controller questioned the pilot if he was receiving the localizer to which he replied, "having a little bit of trouble right now I seem to have lost some gyros but I think we're getting there." The local controller advised the pilot to maintain 2,000 and suggested a heading of 020 to join the localizer, which he acknowledged. At that time, coordination between the local and radar east positions occurred. At 1511:24, the local controller advised the pilot to maintain 1,900 feet until receiving the glideslope, which he acknowledged. Radar data indicates that the flight proceeded towards FAY, and at 1512:15, the pilot was advised that the flight was crossing CINLO, which is the final approach fix. At 1513:30, when the flight was at 1,700 feet msl, about 211 degrees and 2.8 nautical miles from the approach end of runway 4, the local controller asked the pilot if he was receiving the glide slope. The pilot responded, "I'm sorry sir yes sir ah, I would have [unintelligible words] I realize we're coming now."

At 1513:37, the local controller asked the pilot if he wanted, "…to come back out for another approach" to which the pilot stated that, "…I think we're doing OK if it looks OK to you." The local controller informed the pilot that he could not tell with the rate of descent and cleared the pilot for a localizer approach to runway 4. The local controller later stated during an interview that he wanted to give the pilot every opportunity to complete the approach and wanted him to worry less about the glideslope so that is the reason that he cleared him for a localizer approach. The pilot acknowledged the clearance with part of his call sign and approximately 37 seconds later, or at 1514:29, the controller cancelled the approach clearance and advised the pilot to climb and maintain 2,000 feet and fly runway heading, which he acknowledged. Radar data indicates that about that time, the airplane was at 1,300 feet and 1.0 nautical mile from the approach end of runway 4.

At 1514:40, the local controller informed the pilot that overcast clouds existed at 500 feet, the flight was at 1,200 feet about ½ mile away from the runway, and asked the pilot if he wanted to perform another approach. The pilot responded, "that'll be fine thanks one four whiskey." Coordination between the local and east radar positions occurred. Radar data indicates that beginning about 1514:29, to about 1515:03, the pilot turned right to a nearly due east heading despite the instruction from the controller to maintain

runway heading. At 1515:05, the local controller advised the pilot to fly heading 090 degrees climb and maintain 2,000 feet which he correctly read back. The controller then asked the pilot what heading he was flying he reported 081 degrees. The local controller again instructed the pilot to fly heading 090 degrees, climb and maintain 2,000 feet, and to contact Fayetteville Departure Control on frequency 133.0 MHz. Coordination between the local controller and radar east radar controller occurred during which time the local controller stated, "he's having a lot of problems holding a steady heading he's trying a ninety heading right now at two thousand." The transcription does not indicate that the local controller advised the radar controller that the pilot had stated that he lost some of his gyros.

The pilot established contact with Fayetteville Approach Control at 1515:44, and he advised the Radar East controller that he was heading 095 degrees going to 090 degrees. The flight was radar identified and the controller then advised the pilot to climb and maintain 2,300 feet which the pilot acknowledged. At 1516:09, a position relief briefing of the radar east radar control position occurred. During the briefing the weather conditions at FAY was discussed and the comment was that the airport was IFR due to the ceilings. The radar east control position was manned by an OJTI (instructor) and developmental (controller in training). At 1516:42, the radar east OJTI and/or the developmental controller instructed the pilot to turn right to heading 140 degrees, which he acknowledged. At 1517:18, the radar controller advised the pilot to turn right to heading 220 degrees, though the pilot did not respond. The controller repeated the heading which the pilot read back. Radar data indicates that the pilot flew past the instructed heading and at 1517:49, the radar controller asked the pilot what heading he was on and the immediate reply was, "…three one zero" The radar controller again advised the pilot that he was to fly heading 220 degrees, to which the pilot correctly read back the heading. At 1518:01, the controller then stated, "…are you having problems with your airplane you can't um fly an appropriate heading", to which the pilot replied at 1518:05, "ok I'm currently no gyro I think the best thing for me to climb a little bit and go to my alternate of ah Columbus or some point south."

The radar controller questioned the pilot about his ability to navigate to his alternate airport without gyros and he replied he could. The controller then asked the pilot what airport he wanted to go to and at 1518:26, he replied, "…columbus would be fine sir." The radar controller cleared the flight to Columbus County Airport (CPC), and to climb and maintain 3,000 feet, which the pilot did not acknowledge. The controller repeated the clearance and the pilot did not reply. Two more attempts were made to communicate with the pilot and it wasn't until 1519:12, after the second attempt that he replied, "approach." The radar data indicates that from about 1518:36, until his comment approach at 1519:13, the airplane went from a northwesterly heading to a south-southwesterly heading with altitude deviations noted. At 1519:13, the radar controller stated, "and um it appears um your altitude is changing erratically you going up to eighteen hundred down to eighteen hundred then up to two thousand three hundred are you okay." The pilot responded at 1519:21, "uh no im not okay right now." The radar controller asked the pilot if he wanted, "…to come into Fayetteville" to which the pilot stated, "uh the best thing to" but the communication was not finished. The radar data indicates that the airplane turned to a west-southwesterly heading, followed by a left turn to an easterly heading at 1519:41

At 1519:40, the radar controller asked the pilot if he could fly southwest bound and he advised "yeah southwest." The controller then asked the pilot if he was flying southwest bound and he immediately replied that he was flying heading 253 degrees and his altitude was 2,500 feet msl, trying to climb to 3,000 feet msl. The radar data about this time indicates the airplane was heading 245 degrees and the altitude was 2,564 feet. The controller then asked the pilot if he could do a non-gyro standard rate turns to which he replied he could. The controller advised the pilot to start a left turn and about 19 seconds

later told him to stop the turn. The radar data indicated that during that period, the heading began at about 248 degrees and ended at 251 degrees. At 1521:01, the radar controller advised the pilot to expect an ILS approach into FAY, and about 9 seconds later informed the pilot that he did not turn at all during the previous non-gyro start and stop times. The radar controller also asked the pilot if he knew how to do a non-gyro approach, to which he replied that he had done the drill before.

At 1521:53, the radar controller asked the pilot if he was picking up the glideslope and localizer during the first approach and he replied affirmative. The controller advised the pilot to expect an ILS approach runway 4. Radar data indicates that the flight proceeded generally in a southwesterly direction with heading deviations noted, and at 1522:27, the pilot informed the controller that he was flying heading 268 degrees. The controller then asked the pilot if the autopilot was flying the airplane or he was, to which he replied he was. The flight continued generally in a southwesterly direction while maintaining altitude until about 1523:21, at which time the flight proceeded in a southerly direction as instructed by the radar controller. Minimal heading and altitude deviations were noted in the radar data while flying in a southerly heading between 1523:26 and 1526:20. At 1526:17, the radar east controller instructed the pilot to fly west heading 270 degrees. The radar data reflects the pilot turned to and remained on a westerly heading with minimal altitude and heading deviations noted. Based on the upper sounding, pilot reports (PIREPS), and weather radar images, the airplane was in VFR conditions between about 1523 and 1527, which was the entire time the flight was flying in a southerly direction and portion of the flight while flying in a westerly direction.

At 1529:42, the radar controller advised the pilot that the flight was 4 miles from the final approach fix, turn right heading northbound on the 010 and maintain 2,000 feet until established on the localizer, cleared for ILS approach to runway 4. The pilot read back, "…heading 010 maintain 2,000 cleared for the approach." The radar reflects the airplane turned to a north-northeasterly heading and at 1531:16, the pilot advised the radar controller that the flight was established on the localizer. About that time the airplane was at 2,764 feet heading 029 degrees. The radar controller then asked the pilot if he was picking up the glide slope to which the pilot advised he was not. There were no further recorded legible transmissions from the pilot despite numerous attempts by the controller. The radar data reflects a right turn to an east-southeasterly heading beginning about 1531:17, and about 20 seconds later, or at 1531:37, a loud squeal was heard on the frequency; this was attributed to be from the accident airplane.

One witness reported hearing a loud engine sound from a 4 cylinder engine then looked across I-95 and noted smoke from a wooded area. Another witness reported hearing the sound of the engine revved up, "like it was making a dive bomb run." The witness did not see the airplane accident but reported that the airplane flew near his house. Another witness who was inside her residence reported hearing the airplane fly near her house and reported seeing smoke and flames from the accident. The witness then went outside and directed law enforcement to the accident site.

PERSONNEL INFORMATION

The pilot, age 63, held a private pilot certificate with airplane single engine land, and instrument airplane ratings; the instrument rating was issued August 7, 2003. He held a third class medical certificate with a limitation that the holder, "must wear corrective lenses for near and distant vision" issued on March 2, 2011. On the application for the last medical certificate he indicated a total flight time of 1,006 hours.

According to FAA records, on April 11, 2002, he received notice of disapproval for his instrument airplane rating because he failed the "air traffic control clearances and procedures", "instrument approach procedures", and "emergency operations" areas of operations, with special emphasis on partial panel. His pilot logbook reflects he obtained additional flight training which included partial panel training. FAA records also indicate that on June 3, 2002, he received a second notice of disapproval for his instrument airplane rating because he failed the "air traffic control clearances and procedures", "instrument approach procedures", and "emergency operations" with emphasis of flying approaches as published. His pilot logbook reflects that he immediately received some training, but the training tapered off then increased immediately before he obtaining the instrument rating in August 2003.

Further review of the pilot's first pilot logbook which contained entries from March 24, 1999, to November 5, 2005, revealed that about the time he obtained his instrument rating, he had accrued about 67 hours simulated instrument flight and 10 hours actual instrument flight. Since obtaining his instrument rating, he logged approximately 4 hours simulated instrument flight and 16 hours actual instrument flight. Excerpts of the pilot logbook are contained in the NTSB public docket.

The pilot's wife reported that her husband's most recent (second) pilot logbook would have been on-board the airplane at the time of the accident. A thorough search among the burned wreckage did not reveal any remains of a pilot logbook; therefore, no determination could be made as to whether he was instrument current or the date of his last instrument proficiency check.

The pilot's wife provided his known sleep and wake schedule for the previous 7 days. A review of the provided schedule revealed that from December 9th through December 14th, he rested for about 6.5 hours each night, with slight variations notes. On December 15th, she reported that he went to bed after 0230, but she was not sure what time he woke up. She was also not sure what time he went to bed on December 15th, nor the time he woke up on December 16th.

AIRCRAFT INFORMATION

The airplane was manufactured in 1963 by Piper Aircraft Corporation as model PA-28-160, and was designated serial number 28-1215. It was powered by a 160 horsepower Lycoming O-320-D2A engine and equipped with a fixed pitch propeller. The airplane was also equipped with a single-axis autopilot control system that was installed in accordance with supplemental type certificate (STC).

The airplane's flight instruments consisted of an attitude indicator, turn coordinator, vertical speed indicator, airspeed indicator, directional gyro (DG), altimeter, and compass.

The attitude indicator and DG were powered by an engine-driven vacuum pump installed on the accessory case of the engine, and are considered gryo flight instruments. These instruments are connected to the vacuum pump by flexible hoses and stainless steel clamps. Additionally, a vacuum pump regulator and vacuum system filter are installed between the engine-driven vacuum pump and the flight instruments.

The engine-driven vacuum pump consists of a housing, rotor, vanes, inlet and outlet ports, and a shear shaft. The inlet and outlet ports have a fitting, which flexible hoses are connected.

According to the airplane maintenance manual, wear of the vanes of the vacuum pump is compensated for by a vacuum regulator. The vacuum pump regulator is adjusted to a service range of 4.8 to 5.2 inches of Mercury.

The airplane maintenance records reflect that on August 19, 2003, which at the time was owned by the accident pilot, a new engine-driven vacuum pump part number RA215CC, serial number A9749, was installed on the engine. The engine-driven vacuum pump was manufactured under FAA Parts Manufacturer Approval (PMA), and was equipped with an inspection port for determining wear of the vanes. The recording tachometer time at installation was recorded to be 2960.41. The last entry in the airframe maintenance records dated January 27, 2012, associated with the last annual inspection, indicates the tachometer time was 3558.4, or an elapsed time of approximately 598 hours since the new engine-driven vacuum pump was installed. Between the date of the engine-driven vacuum pump installation and the date of the last annual inspection, there was no record of replacement or repair of the tachometer, or removal, replacement, or repair of the engine-driven vacuum pump.

The airplane maintenance records further indicate that the last altimeter, automatic pressure altitude reporting system, static system, and ATC transponder tests were performed on January 4, 2012. Copies of the maintenance record entries are contained in the NTSB public docket.

METEOROLOGICAL INFORMATION

At 0740 EST, or about 6 hours 20 minutes before the accident flight departed, a meteorological impact statement (MIS) for ATC planning purposes only, valid for the accident site through 1500 EST, advised of IFR conditions with rain from central Virginia through central North Carolina. The conditions were expected to slowly improve after 1200 EST to VFR.

Airmet Sierra issued at 1126 EST, or approximately 2 hours 34 minutes before the flight departed, valid for the accident time, forecast IFR conditions for the accident site with ceilings below 1,000 feet and visibilities below 3 miles with precipitation, mist, and fog.

The destination airport terminal area forecast (TAF) issued at 1241 EST, or approximately 1 hour 19 minutes before the flight departed, valid for a 24 hour period beginning at 1300 EST, expected the wind from 180 degrees at 5 knots, visibility greater than 6 miles, and overcast clouds at 300 feet above ground level (agl). Temporary conditions of a broken ceiling at 1,000 feet agl were forecast between 1300 and 1700 EST.

A surface observation weather report taken at the destination airport (FAY) at 1253 EST, or about 1 hour 7 minutes before the flight departed, indicated the wind was from 230 degrees at 4 knots, the visibility was 7 statute miles, and overcast clouds existed at 300 feet. The temperature and dew point were each 13 degrees Celsius, and the altimeter setting was 30.01 inches of Mercury.

The area forecast issued at 1345, or about 15 minutes before the flight departed, and about 2 minutes before the pilot contacted IAD DUATS, forecasted a broken ceiling between 1,500 and 2,500 feet msl, and an overcast layer between 8,000 and 10,000 feet msl with layered clouds through Flight Level 240 (24,000). Occasional visibilities between 3 and 5 miles and mist were forecast with widely scattered light rain showers.

At 1347 hours local, the pilot accessed DUATS vendor IAD. Although the records from the transaction were not requested in time and were not available, weather information that would have been available to the pilot at that time included the airmet sierra for IFR conditions, the 1253 surface observation for the destination airport, and destination airport TAF.

A surface observation weather report taken at FAY at 1543, or about 11 minutes after the accident, indicates the wind was from 210 degrees at 3 knots, the visibility was 3 statute miles with mist, scattered clouds existed at 700 feet, and overcast clouds existed at 1,300 feet. The temperature and dew point were each 14 degrees Celsius, and the altimeter setting was 29.99 inches of Mercury. The accident site was located about 8 nautical miles and 207 degrees from the center of FAY.

According to the NTSB Weather Group Factual Report, there was a high probability of clouds between the surface and 2,500 feet, then another cloud layer from 8,000 to 25,000 feet. Plotting of the aircraft's flight path overlaid onto weather radar images indicates that between 1516 to before 1522, the airplane flew through 20 to 30 dBz reflectivity values, and likely encountered precipitation while located within a cloud layer. At 1528, or approximately 4 minutes before the accident, the airplane was flying in a westerly direction and encountered weather radar echoes with reflectivity between 20 and 30 dBz, consistent with rain showers within a cloud layer. The weather radar image at 1533, or approximately 1 minute after the accident indicates the cell had moved to the east with the accident site located in an area with no weather radar reflectivity echoes. The NTSB Weather Factual Report is contained in the NTSB public docket.

AIDS TO NAVIGATION

On the day of the accident about 0000, the runway 4 ILS DME monitor was recorded in the FAY Daily Record of Facility Operation Log as being out of service and was carried over from the previous log.

As a result of the accident, at 1758 EST, the Runway 4 ILS navigation equipment consisting of the localizer, glide slope, DME, and outer marker were taken out of service (OTS), and a notice to Airman (NOTAM) was issued. Records provided by FAA indicate that the localizer, glide slope, DME, and outer marker were checked postaccident and the "As Found" readings were within tolerance. The navigation equipment was certified and returned to service (RTS) at 2316, as indicated by the FAY Daily Record of Facility Operation Log.

COMMUNICATIONS

The pilot was in contact with the Fayetteville Regional Airport air traffic control tower at the time of the accident. There were no reported communication difficulties.

AIRPORT INFORMATION

The Fayetteville Regional Airport/Grannis Field is a public use airport equipped with multiple runways designated 4/22 and 10/28. Runway 4/22 is 7,709 feet long and 150 feet wide and is serviced by an instrument landing system (ILS) or Localizer/DME, RNAV (GPS), and VOR instrument approaches.

The terminal approach chart for the ILS approach to runway 4 at FAY specifies that the minimums for a category A airplane (accident airplane) is 200 feet and ¾ mile visibility. The approach specified to maintain 2,300 feet until reaching ZODGI which is 13.3 DME from the I-GRA Localizer which is set to

110.5 MHz. From ZODGI a descent to CINLO which is the glideslope intercept point and also the final approach fix. CINLO is located 6.5DME from I-GRA Localizer. From CINLO a 3.00 degree descent commences to 200 feet and ¾ mile. The published missed approach is to climb to 1,100 feet then climbing right turn to 3,000 feet and intercept the FAY VOR/DME 131 degree radial and fly outbound to the GANDS Intersection which is 14.6 DME from the FAY VOR/DME.

WRECKAGE AND IMPACT INFORMATION

The airplane crashed in a heavily wooded area; the accident site was located at 34 degrees 52.362 minutes North latitude and 078 degrees 57.138 minutes West longitude, or approximately 7.5 nautical miles and 206 degrees from the approach end of runway 4 at FAY. A postcrash fire occurred in the immediate area.

Further examination of the accident site revealed debris along an energy path oriented on a magnetic heading of 044 degrees. Damage to trees of decreasing heights were noted between the resting position of a portion of the right wing and an impact crater located approximately 41 feet from the resting position of the right wing. The impact crater was noted to have the propeller partially buried in it. Debris along the energy path and to the left and right of the energy path centerline was noted and major components were documented.

Wreckage debris located on the right side of the energy path centerline consisted of the outer portion of the left wing, center portion of left wing, and left wing fuel tank, while debris located to the left of the energy path centerline consisted of the inboard section of the right wing. The empennage with both stabilizers and rudder was located on the energy path centerline about 40 feet from the ground impact crater. The engine assembly was located on the energy path about 21 feet from the resting point of the cockpit, cabin, and main spar. The wreckage was recovered for further examination, and components consisting of the suction gauge, attitude indicator, directional gyro, electric turn coordinator, vacuum pump regulator, KX155 communication and navigation transceiver, and Apple 64GB iPad; were secured for further examination.

Examination of the airplane following recovery revealed the airframe was extensively fragmented. All structural components with the exception of the outer section of the right wing, and a small outer section of the left wing were extensively heat damaged. All components necessary to sustain flight were accounted for at the accident site. Examination of the flight controls for roll, pitch, and yaw revealed no evidence of preimpact failure or malfunction.

Examination of the cockpit revealed the instrument panel was not identified with the exception of the portion that contained the suction gauge, and a separate section that contained the directional gyro. All remaining flight and engine instrument were separated from the panel and found loose at the accident site. The No. 2 communication transceiver which was not digital exhibited impact damage; the communication selector was in the off position. The communication frequency was between 128.20 and 127.25 MHz while the navigation frequency was between 108.75 and 108.80 MHz; the Fayetteville VOR frequency is 108.8 MHz. The VOR/LOC Converter & Glide Slope indicator and the VOR/LOC Converter indicator were extensively impact damaged which precluded any type of testing. A terminal instrument approach chart book for southeast 2 was found in the wreckage. The book was valid until November 15, 2012. The book was turned to the ILS or LOC/DME RWY 4 page of FAY; the page was torn.

Examination of the left wing revealed it was fragmented into 4 major pieces. The flap and aileron were accounted for at the accident site. The outer portion of the aileron exhibited tree contact with the tree strike oriented with the wing 90 degrees to the right of normal direction of travel. The aileron bellcrank remained attached structurally, and 1 cable remained attached to the bellcrank but that cable exhibited tension overload approximately 7 inches from the bellcrank attach. The other aileron control cable clevis remained attached to the bellcrank but the cable pulled through the clevis. The main spar exhibited bending. A tree contact was noted on the leading edge of the wing about 32 inches, or 3 ribs inboard from the wingtip end rib. The pitot mast was in-place but the lines were damaged.

Examination of the right wing revealed it was fragmented into 3 major pieces. The outer section of the wing with the attached aileron did not exhibit fire damage. The leading edge of the wing about 21 inches inboard from the wingtip end rib was torn. The flap remained attached. The aileron bellcrank was structurally separated. Both aileron control cables remained attached to the bellcrank, but one cable exhibited tension overload 66 inches inboard from the bellcrank while the other cable exhibited tension overload 62 inches inboard from the bellcrank.

Examination of the empennage revealed it was separated approximately 28 inches forward of the aft fuselage bulkhead. The full-span stabilator remained attached, and both stabilator flight control cables remained attached to the stabilator balance weight assembly. Both cables were cut. The leading edge of the right stabilator was displaced up approximately 90 degrees at the tip. Both rudder flight control cables remained connected at the bellcrank near the control surface, and the rudder remained connected to the vertical stabilizer. The vertical stabilizer was rolled to the left approximately 70 degrees.

Examination of the separated engine revealed impact and fire damage. The engine-driven vacuum pump remained secured to the accessory case of the engine, but the vacuum pump was damaged by fire and the outlet fitting was fractured. The drive coupling was melted. Both magnetos, the oil filter, starter, and alternator were separated from the engine, but the carburetor and engine-driven fuel pump were partially secured to the engine. The crankshaft flange was separated and remained attached to the propeller hub; the remaining portion of the crankshaft was noticeably bent which precluded rotation of the crankshaft by hand. The Nos. 2 and 4 cylinders were removed which allowed for visual inspection of the powertrain components which revealed no evidence of preimpact failure or malfunction. Examination of the impact and heat damaged carburetor revealed the control cables remained attached at their respective attach points. Disassembly inspection of the carburetor revealed impact damage to one of the brass floats consistent with hydraulic deformation, while the other float was partially separated from the float arm and exhibited heat damage. No fuel was noted in the float bowl. The engine-driven fuel pump was extensively heat damaged. Both magnetos were separated from the accessory case. One magneto was destroyed by fire and the other magneto produced spark at all ignition towers when rotated by hand. Inspection of the spark plugs revealed all exhibited normal wear and color signatures, and inspection of the ignition harness revealed it was fire and impact damaged. The oil suction screen was clean, and the oil filter element was examined and no ferrous particles were noted. The engine-driven vacuum pump was retained for further examination.

Examination of the two-bladed fixed-pitch propeller revealed one blade was fractured near the hub and the other blade was full span. The fractured blade exhibited "S" bending, leading edge twisting, and chord-wise abrasions. The other blade exhibited a smooth-radius aft approximately 90 degrees, and chord-wise abrasions.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination of the pilot was performed by the North Carolina Department of Health and Human Services, Office of the Chief Medical Examiner (OCME) , Raleigh, North Carolina. The autopsy reported indicated the cause of death was "Massive blunt force trauma due to plane crash."

Forensic toxicology was performed on specimens of the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, and also by the OCME. The toxicology report by FAA stated testing for carbon monoxide and cyanide was not performed. No ethanol was detected in the submitted urine specimen, while unquantied amounts of chlorpheniramine, metoprolol, and pseudoephedrine were detected in the submitted muscle specimen. Chlorpheniramine, ephedrine, oxymetazoline, and pseudoephedrine were detected in the submitted urine specimen. A copy of the toxicology report is contained in the NTSB public docket.

The results of analysis by OCME indicated the carbon monoxide level was less than 5 percent saturation, and no ethanol was detected. A copy of the toxicology report is contained in the NTSB public docket.

TESTS AND RESEARCH

The airplane was fueled at the departure airport before departure. According to the person who fueled the airplane, both tanks were fueled bringing the level of fuel in each tank to within 1 inch of the top. There were no reported issues related to the fuel at the departure airport.

The pilot's alternate airport on his IFR flight plan was listed as Columbus County Municipal Airport (CPC), Columbus, North Carolina. The CPC Airport is located about 42 nautical miles south-southeast from FAY Airport.

Based on the true airspeed listed in the flight plan from DYB to FAY (100.0 knots), the estimated time en-route under no wind conditions from FAY to CPC Airport was calculated to be approximately 25 minutes. Based on the time the pilot first advised the controller that he wanted to proceed to CPC, his estimated time of arrival at CPC would have been about approximately 1543.

A surface observation report taken at the CPC Airport at 1535, or about 3 minutes after the accident, revealed the wind was calm, the visibility was 10 miles, scattered clouds existed at 2,900 feet, and a ceiling of broken clouds existed at 5,500 feet. The temperature and dew point were 16 and 15 degrees Celsius respectively, and the altimeter setting was 29.99 inches of Mercury.

An iPad located in the wreckage was retained and sent to the NTSB Vehicle Recorder Division located in Washington, DC. Examination of the iPad revealed impact damage to two internal chips; therefore, no data could be recovered from the device. A copy of the report from the Vehicle Recorder Division is contained in the NTSB public docket.

As previously reported, the engine-driven vacuum pump had accrued about 598 hours since installation at the last annual inspection. According to a service letter by the vacuum pump manufacturer, it is recommended that the vacuum pump be replaced after 6 years; the service letter is not mandatory.

Inspection of the suction gauge revealed the needle was off scale high, and the glass was fractured. Inspection of the gauge face was performed by NTSB Materials Laboratory personnel using a 5 and 50 power zoom stereomicroscope for needle witness marks; none were found. A copy of the NTSB Materials Laboratory Factual Report is contained in the NTSB public docket.

Inspection of the electric turn coordinator was performed at the manufacturer's facility with FAA oversight. The results of the significantly impacted instrument examination indicate rotational scoring of the rotor assembly. A copy of the report from the manufacturer and FAA concurring statement is contained in the NTSB public docket.

Inspection of the engine-driven vacuum pump was performed at the manufacturer's facility with FAA oversight. The results of the examination indicate the unit exhibited extensive heat damage. The external drive gear and shear shaft were damaged beyond recognition due to heat damage. Visual inspection of the front end of the component revealed deformation consistent with impact damage. Disassembly inspection revealed the rotor was cracked and vane No. 5 was chipped. No apparent scratches or gouges were detected in the internal cavity wall. Visual inspection of the rear end of the component revealed the portion of chipped No. 5 vane was lodged in the outlet port. Inspection of the front end revealed the internal gear was damaged beyond recognition due to heat. Visual inspection of the bearing showed some deep rotational scratches. The report from the manufacturer with FAA concurring statement is contained in the NTSB public docket.

Inspection of the engine-driven vacuum pump was then performed by the NTSB Materials Laboratory located in Washington, D.C. The examination of the rotor revealed the primary and secondary fractures, and fractures extending between the center hole and vane slots 5 and 6 all intersected at an area of the center hole surface approximately 0.25 inch to 0.375 inch from the aft surface. An impression was noted on the aft flange corresponding to contact with the corner between the outer surface and vane slot No. 6 on rotor piece marked B. An impression was also observed on the forward flange corresponding to the edge of vane slot No. 2 rotor piece marked B. No evidence of rotational sliding was observed at the impression on the forward or aft flanges or the corresponding locations on the rotor. A copy of the NTSB Materials Laboratory examination report is contained in the NTSB public docket.

Inspection of the Honeywell (formerly Bendix-King) KX155 communication transceiver and navigation receiver was performed at the manufacturer's facility with FAA oversight. The examination revealed extensive impact damage to the unit and non-volatile memory chip which precluded operational testing or recovery of the stored navigation and communication frequencies. A copy of the report is contained in the NTSB public docket.

Inspection of the vacuum regulator was performed at the manufacturer's facility with FAA oversight. The examination revealed extensive impact and heat damage which precluded operational testing. No determination could be made as to the vacuum regulator vacuum setting at the time of the accident. The unit was inspected and a copy of the report and FAA concurring statement is contained in the NTSB public docket.

Examination of the attitude indicator (AI) and directional gyro (DG) were performed at a FAA repair station with NTSB oversight. The inspection of both components revealed extensive impact damage which precluded operational testing. No scoring was noted to the rotor of the AI, while light rotational scoring of the rotor housing of the AI was noted at an area between the 4 and 7 o'clock positions;

however, no corresponding scoring of the rotor was noted. Inspection of the fire and impacted DG revealed no rotational scoring to the rotor or rotor housing. A copy of the examination notes is contained in the NTSB public docket.

ADDITIONAL DATA

Previous NTSB Recommendations Concerning Controller Emergency Awareness

On December 15, 1993, as a result of an accident investigated by NTSB in which a Mitsubishi MU-2B-60 crashed in instrument meteorological conditions during an approach for an emergency landing, the NTSB issued recommendation A-93-158 to FAA to enhance the emergency assistance section of Air Traffic Control Handbook 7110.65 to fully address the issue of selecting the best possible diversion airport for an IFR aircraft in an emergency status. The NTSB also submitted recommendation A-93-160 to FAA to provide expanded emergency procedures training for air traffic controllers. This recommendation also indicated that the general capabilities of airplanes in various emergency scenarios involving air traffic control should be a focal point of this training, and past air traffic control-related accident reports should be used. About 1 year later the FAA responded that it had developed a training course to address emergency procedures training for air traffic controllers and that it had developed a training aid titled, "ATC Challenge" to help improve and strengthen controllers' knowledge of other topics involving emergency situations. In June 1995, the Safety Board classified this recommendation as "Closed – Acceptable Action"; however, in January 2001, the Safety Board learned that the "ATC Challenge" was no longer in use.

On September 24, 2001, as a result of several accidents investigated by NTSB in which FAA air traffic control (ATC) controller personnel lacked awareness of emergency situations, and also because the "ATC Challenge" was no longer in use, the NTSB submitted to FAA in part recommendations A-01-35 and A-01-36. Recommendation A-01-35 recommended FAA amend FAA Order 7110.65, "Air Traffic Control" paragraph 10-2-5, "Emergency Situations," to include as emergencies in part in-flight failure of attitude instruments needed to operate safely in IMC if the affected aircraft cannot remain in visual meteorological conditions for the remainder of its flight. Recommendation A-01-36 suggested FAA develop and ensure that air traffic controllers receive academic and simulator training that teaches controllers to quickly recognize and aggressively respond to potential distress and emergency situations in which pilots may require air traffic control (ATC) assistance. This included in part an understanding of common aircraft system failures that may require ATC assistance or special handing, and the application of special techniques for assisting pilots that encounter aircraft system failures. The recommendation also indicated that the training should be based on actual accidents or incidents, include a comprehensive review of successful flight assists and the techniques used, and be reviewed annually to ensure that the training materials remain current and effective.

In response to recommendation A-01-35, the FAA responded on November 29, 2001, that FAA Order 7110.65, Air Traffic Control adequately addresses this recommendation. The NTSB classified recommendation A-01-35 on July 16, 2002, as, "Closed—Reconsidered."

In response to recommendation A-01-36, the FAA developed computer-based instruction (CBI) course 57098 titled Recognizing and Responding to Aircraft Emergencies, and in August 2004, began national distribution of the course. The FAA also revised Joint Order 3120.4M, "Air Traffic Technical Training" which details the requirements for local, facility-led annual air traffic controller training which includes

real-life scenarios, and addressed the potential domino effects of common inflight mechanical problems. In June 2012, the NTSB classified recommendation A-01-36 as, "Closed-Acceptable Action."

Computer-based instruction (CBI) course 57098 Recognizing and Responding to Aircraft Emergencies

NTSB review of the current course material contained in the CBI revealed it discussed different types of emergency situations, in-flight mechanical issues and possible domino effects, communication techniques, and finally notification procedures for emergency situations. Although flight equipment malfunction is mentioned as one possibly emergency, a pilot reported gyro malfunction was not discussed.

Postaccident FAA Controller Interviews

As part of the investigation, a NTSB air traffic control specialist conducted interviews of personnel of the FAY ATCT consisting of the Radar East controller, the Radar East OJTI controller, the Radar East developmental controller, the local controller, and the Front Line Manager (FLM). The local controller and the Radar East controller who were in contact with the pilot when he advised that he had either lost his gyros or was no gyro both reported those comments meant that the pilot could not maintain headings. The local controller stated he did not know that a comment from a pilot pertaining to lost gyros would affect the pilot's ability to keep the wings level, or about turns and turn rates. He also indicated he did not recall any refresher training in unusual situations or about no-gyro emergencies. The Radar East controller reported conducting emergency training quite often, but that a reported loss of gyro was not covered. The Radar East OJTI controller reported that he could not recall doing any recurrent training on emergency situations, but did state that he had completed training previously through a briefing or CBI module. He also stated that the pilot's comment concerning the gyro issue meant the pilot would have difficulty maintaining direction of flight. The Radar East developmental controller stated that training about unusual emergency situations was mostly done with monthly recurrent training via the CBI, MBI, and verbal briefs. He also advised he would not know what would happen of a pilot were to lose the gyros of the airplane. The FLM stated that the facility had conducted team briefings on emergency situations and losses of equipment, but not consistently. He also stated that a comment about loss of gyro meant the pilot could not turn or maintain headings. The Radar East OJTI, and the Radar East developmental controllers did not know the weather conditions at the alternate airport (CPC), and the Radar East developmental controller stated that in hindsight, the pilot's comment that he was not OK was an indication that he was in distress, and the flight should have continued to CPC. The NTSB ATC Group Chairman Factual report which contains the interview summaries is contained in the NTSB public docket.

FAA Order JO 7110.65U, "Air Traffic Control"

Review of Section 10 of the order titled "Emergencies" provides controllers with the following guidance on recognizing and handling emergency situations:

Section 10-1-1 Emergency Determinations:

An emergency can be either a distress or an urgency condition as defined in the Pilot/Controller Glossary. The section also indicates that a pilot who encounters a distress condition should declare an emergency with the word "Mayday" preferably repeated three times, or "Pan-Pan" if an urgency condition also preferably repeated three times. If "Mayday" or "Pan-Pan" are not broadcast by the pilot

but you (controller) are in doubt that a situation constitutes an emergency or potential emergency, handle it as though it were an emergency. Because of the infinite variety of possible emergency situations, specific procedures cannot be prescribed; however, when you believe an emergency exists or is imminent, select and pursue a course of action which appears to be most appropriate under the circumstances and which most nearly conforms to the instructions in this manual.

Section 10-1-2 Obtaining Information:

Obtain enough information to handle the emergency intelligently. Base your decision as to what type of assistance is needed on information and requests received from the pilot because he/she is authorized by 14 CFR Part 91 to determine a course of action.

Section 10-2-1 Information Requirements:

a. Start assistance as soon as enough information has been obtained upon which to act. Information requirements will vary, depending on the existing situation. Minimum required information for inflight emergencies is:

NOTE-
In the event of an ELT signal see para 10-2-10 Emergency Locator Transmitter (ELT) Signals.

1. Aircraft identification and type
2. Nature of the emergency
3. Pilot's desires

b. After initiating action, obtain the following items or any pertinent information from the pilot or aircraft operator, as necessary:

NOTE-

Normally, do not request this information from military fighter-type aircraft that are at low altitudes (i.e. on approach, immediately after departure, on a low level route, etc.). However, request the position of an aircraft that is not visually sighted or displayed on radar if the location is not given by the pilot.

1. Aircraft altitude
2. Fuel remaining in time
3. Pilot reported weather
4. Pilot capability for IFR flight
5. Time and place of last known position
6. Heading since last known position
7. Airspeed
8. Navigation equipment capability
9. NAVAID signals received
10. Visible landmarks
11. Aircraft color
12. Number of people on board
13. Point of departure and destination
14. Emergency equipment on board

Pilot Information

Certificate:	Private	**Age:**	63
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	March 2, 2011
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	1006 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N5714W
Model/Series:	PA-28-160	**Aircraft Category:**	Airplane
Year of Manufacture:	1963	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	28-1215
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	January 27, 2012 Annual	**Certified Max Gross Wt.:**	2200 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	6959 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Installed	**Engine Model/Series:**	0-320-D2A
Registered Owner:	Virgil T. Deal	**Rated Power:**	160 Horsepower
Operator:	Virgil T. Deal	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	FAY,189 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	15:43 Local	**Direction from Accident Site:**	27°
Lowest Cloud Condition:	Scattered / 700 ft AGL	**Visibility**	3 miles
Lowest Ceiling:	Overcast / 1300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	14°C / 14°C
Precipitation and Obscuration:	Moderate - None - Mist		
Departure Point:	Summerville, SC (DYB)	**Type of Flight Plan Filed:**	IFR
Destination:	Fayetteville, NC (FAY)	**Type of Clearance:**	IFR
Departure Time:	14:00 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	Fayetteville Regional FAY	**Runway Surface Type:**	Asphalt
Airport Elevation:	189 ft msl	**Runway Surface Condition:**	
Runway Used:	04	**IFR Approach:**	ILS
Runway Length/Width:	7709 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	34.872776,-78.952224

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Tony W Bernhardt; FAA/FSDO; Greensboro, NC Russell D Walker; FAA-ATO Terminal Operations; Washington, DC Arnold Wolfe; FAA/FSDO; North Olmsted, OH Jeffrey D Price; FAA/FSDO; Wichita, KS Marvin Trease; FAA/FSDO; Kansas City, MO Michael Pieczynski; FAA/FSDO; Milwaukee, WI Curt Fischer; NATCA; Merrimack, NH Ron Maynard; Piper Aircraft, Inc.; Vero Beach, FL James M Childers; Lycoming; Williamsport, PA John Wicht; Rapco, Inc.; Hartland, WI Mark W Smith; Mid-Continent Instruments and Avionics; Wichita, KS Daniel E Scholz; Parker Hannifin Corporation; Elyria, OH Bill Gill; Honeywell; Olathe, KS
Original Publish Date:	April 10, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=85823