National Transportation Safety Board
Aviation Accident Final Report

Location:	Prescott, AZ	**Accident Number:**	LAX07FA012
Date & Time:	10/18/2006, 1347 MST	**Registration:**	N121CS
Aircraft:	Piper PA-42	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	5 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilot of a MiG 21 and the pilot of a Piper PA-42 Cheyenne III met just prior to the flight to discuss the flight in which the Cheyenne pilot would be taking aerial photos of the MiG. The two pilots established a minimum altitude of 2,500 to 3,000 feet agl and 200 knots as their minimum airspeed. The pilots did not establish a minimum separation distance, as it was not intended to be a formation flight. The MiG pilot reported that after takeoff the aircraft experienced a problem with the landing gear retraction. The pilot recycled the landing gear and a successful gear retraction was indicated. The MiG pilot notified the Cheyenne pilot of the situation and the Cheyenne pilot indicated that they would join up with the MiG, look it over and check-out the landing gear, and let the MiG pilot know what they saw. The MiG pilot flew at 9,000 feet msl in a 30-degree right hand turn at 200 knots (about 90 percent power set) with approach flaps selected (approximately 25 degrees) until the Cheyenne met up with the MiG. The MiG pilot reported that he observed the Cheyenne meet up with him at his 5 o'clock position about 300-400 feet behind him and about the same altitude. In this position, the Cheyenne was in the direct path of the high velocity jet core exhaust from the MiG. The MiG pilot looked forward and when he looked back, he could not see the Cheyenne. The Cheyenne pilot then contacted the MiG pilot and made a comment about the right landing gear or gear door, but the statement was not completed. The MiG pilot did not hear back from the Cheyenne pilot. The MiG pilot then observed smoke rising from the desert terrain and notified air traffic control. The airport manager that was monitoring the conversation between the two aircraft stated that he heard the Cheyenne pilot indicate that he would "drop down and go underneath and let you know how it looks." Wreckage documentation noted that the main wreckage was located in an inverted position on flat terrain. The T-tail, which consisted of the upper half of the vertical stabilizer, horizontal stabilizer, and elevator had separated in flight and was located about 1/2 mile south of the main wreckage. Inspection of the upper portion of the aft vertical spar displayed a right bend and twist at the point of separation. No evidence of pre-existing cracks, corrosion or wear was noted to the material. Inspection of the MiG aircraft found no evidence of contact between the two aircraft.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the pilot following a jet aircraft to maintain adequate separation from the high velocity jet core exhaust. The separation of the T-tail upper section vertical stabilizer of the following aircraft due to contact with the high velocity jet core exhaust was a factor.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: MANEUVERING

Findings
1. (C) CLEARANCE - INADEQUATE - PILOT IN COMMAND
2. (F) VERTICAL STABILIZER - FAILURE,TOTAL

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
3. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On October 18, 2006, at 1347 mountain standard time, a Piper PA-42 (Cheyenne III), N121CS, was destroyed when its tail section separated in flight while maneuvering about 16 nautical miles northeast of Prescott, Arizona. The airline transport pilot and four passengers sustained fatal injuries and the airplane was destroyed by impact damage and post-crash fire. The airplane was registered to Flying Moose LLC and operated by the pilot under the provisions of 14 CFR Part 91 as an aerial photography flight. Visual meteorological conditions prevailed and a flight plan was not filed for the local flight that departed the Ernest A. Love Field, Prescott, about 15 minutes before the accident.

The intent of the flight was to take aerial photographs of a MiG 21 airplane (N21UT). The pilot of the MiG 21 indicated that he and the Cheyenne pilot discussed the photo flight the day of the accident, and had established 2,500 to 3,000 feet above ground level (agl) as their minimum altitude and 200 knots as their minimum airspeed. The MiG and Cheyenne pilot did not establish a minimum separation distance, as it was not intended to be a formation flight. The MiG pilot reported that they intended on adjusting the in-flight separation as the flight progressed.

The MiG pilot reported that he departed the Prescott airport and flew straight out on a northeast heading. On departure, he experienced a problem retracting the landing gear and noted that only the nose landing gear successfully retracted. He recycled the landing gear handle from up to off and back to the up position, and received a successful gear retraction indication. He notified the Cheyenne pilot of the landing gear problem, but informed him that he believed the landing gear was retracted. The Cheyenne pilot indicated that they would join up with the MiG, look it over and check-out the landing gear, and let the MiG pilot know what they saw.

The MiG pilot flew the airplane at 9,000 feet mean sea level (msl) in a 30-degree right-hand turn at 200 knots (about 90 percent power set) with approach flaps selected (approximately 25 degrees). He continued to circle in that configuration to allow the Cheyenne to rendezvous with the MiG. The MiG pilot reported that he observed the Cheyenne meet up at his 5 o'clock position about 300-400 feet behind him and about the same altitude. The MiG pilot looked forward and when he looked back to the Cheyenne, he could not see it. About 30 seconds later, he heard the Cheyenne pilot comment about the right landing gear or gear door, but the statement was not completed. The MiG pilot waited to hear back from the Cheyenne pilot, but when he did not receive any additional information, he asked the Cheyenne pilot to repeat because he did not understand the last transmission. The Cheyenne pilot did not respond and the MiG pilot never received additional information.

The MiG pilot continued flying in that manner and tried to reach the Cheyenne pilot over the radio. After a couple of minutes he observed a column of smoke rising from the desert terrain and became concerned about the Cheyenne. The MiG pilot called the Prescott air traffic controller and asked if they were receiving an emergency locator transmitter (ELT) because he could not see the Cheyenne; could not reach him over the radio, and could now see a column of smoke in the area in which they were flying. The controller reported that they were not receiving an ELT signal but asked for global positioning system (GPS) coordinates for the smoke so they could send someone to check it out. The MiG pilot provided the coordinates and

flew around a while longer to burn off fuel prior to landing. He informed the controller that he was having problems with his landing gear so the controller cleared him for the option. The MiG pilot subsequently landed uneventfully.

The passenger (a non-pilot) in the MiG indicated that she heard the MiG pilot state to the Cheyenne pilot to "go ahead and fly under the airplane and check."

A statement provided by the Prescott airport manager indicated that he observed the Cheyenne pilot and the MiG pilot discussing the upcoming photo flight. The MiG was to form up with the Cheyenne and make passes at the right side of the Cheyenne where the cameras would be located shooting out the open right side window. The airport manager also stated that he observed the Cheyenne takeoff and noted that the right side window had been removed. The airport manager stated that he was listening to both aircraft as they taxied and departed the airport. He then switched frequencies to the air-to-air frequency used by the MiG and Cheyenne pilot (123.45 Mhz). He reported hearing the conversation between the MiG and the Cheyenne pilots, and then heard the Cheyenne pilot indicate that he would "drop down and go underneath and let you know how it looks" after the MiG pilot informed him that he had recycled his landing gear and believed they were retracted.

PERSONNEL INFORMATION

The pilot of the Cheyenne held an airline transport pilot and commercial pilot certificates and was rated in the multi-engine land, single-engine land and sea aircraft. The pilot held type ratings in the Cessna CE-500, DC-3 and authorized experimental aircraft: N-T28. The pilot's flight logbook indicated approximately 4,363 hours of flight time in all aircraft, with 4,088 hours as pilot-in-command. A class I Federal Aviation Administration medical certificate was issued on September 1, 2006. No waivers or limitations were noted.

AIRCRAFT INFORMATION

The accident aircraft was manufactured by the Piper Aircraft Company in 1981, as a PA-42, Cheyenne III. The airframe primary structure is of all metal construction. The fuselage is an all metal, semi-monocoque structure with riveted skins. The airframe consists of three basic units: the nose section, the pressurized cabin section, and the tail section.

The Piper Aircraft Pilot Operating Handbook, Description & Operation section describes the empennage as, "The empennage is a T-tail design consisting of a vertical stabilizer (fin), a rudder, a horizontal stabilizer and elevators. The rudder and left elevator each have trim tabs which are controlled from the cockpit. The right elevator has an anti-servo tab to provide pitch control forces. The empennage group components are metal cantilever structures with removable composite tips. Both the vertical and horizontal stabilizers incorporate two full span main spars."

The MiG 21 UM, was manufactured by Mikoyan Gurevich in 1974 as a fixed wing, single-engine turbo-jet. The turbo-jet is a Tumansky model R-11F-300 which is located in the tail section and emits a high velocity exhaust gas from the aft end. The aircraft is operated under an experimental classification and exhibition category.

WRECKAGE AND IMPACT INFORMATION

The Cheyenne's main wreckage (which included the entire aircraft with the exception of the upper half of the vertical stabilizer, horizontal stabilizer, and elevator) was located at a global positioning system (GPS) measured location of 34 degrees 52.821 minutes north latitude and

112 degrees 15.197 minutes west longitude at a terrain elevation of 4,366 feet msl. The main wreckage came to rest on a heading of 230 degrees, in an inverted position, and had sustained fire damage throughout its entirety with the exception of the aft empennage, lower vertical stabilizer, and rudder. The fuselage and wing skin had melted allowing investigators to trace the control cables from the cockpit to the ailerons, rudder, and base of the elevator pushrod. No anomalies with the cables were noted. In addition, the engine controls were traced from the cockpit to their respective engines. Evidence of both wings flight control surfaces were noted in their respective positions.

The T-tail section of the airplane came to rest at a GPS measured location of 34 degrees 52.420 minutes north latitude and 112 degrees 15.241 minutes west longitude at a terrain elevation of 4,466 feet msl about one-half miles south of the main wreckage. The tail section included the upper portion of the vertical stabilizer, the horizontal stabilizer and elevator, which all remained intact and came to rest on the topside of the horizontal stabilizer/elevator. The tail section did not sustain any fire damage, and was missing the left elevator counter weight. Movement of the elevator revealed no binding or pre-existing anomalies.

On October 20, 2006, the tail section was transported to the location of the main wreckage where they were examined together.

During the examination it was noted that the vertical stabilizer separated in two sections at approximately water line (W.L). 71. The lower portion, as well as the rudder, remained with the fuselage. The lower portion of the vertical stabilizer was partially flattened along the upper fuselage. The left side of the vertical forward spar extended about 4 feet 8 inches above the fuselage, had a 90 degree bend near mid length and was twisted behind the right side of the forward spar. The right side of the forward spar extended about 4 feet above the fuselage, was bent aft and was bowed forward slightly. Skin was separated along both sides of the forward spar.

The left side of the aft spar extended about 4 feet, 8 inches and had a gentle aft bend about 35-40 degrees. The right side of the aft spar extended about 5 feet eight inches from the base of the bulkhead and had a gentle aft bend about 180 degrees. All the separated ends of both the forward and aft vertical spar caps, had sharp edges and were angled about 45 degrees.

The rivet lines all appeared to have been secure prior to the separation. No corrosion, working rivets, loose or missing fasteners were noted. No evidence of pre-existing cracks or corrosion was noted.

A portion of the rudder remained attached to the lower portion of the vertical stabilizer which separated near mid-length. The upper attach fitting remained in place, while the lower rudder attach fitting was separated. The separated fasteners appeared to have been pulled through the sector and displayed sharp edges. No evidence of working fasteners, cracks or corrosion was noted. The aft rudder sector was displaced from the lower hinge bearing, and was pulled forward from its normal position. The rudder cables were in place, secure and continuous to the forward rudder sector attach points. The forward rudder sector had been consumed by the fire.

The elevator push-pull tube separated near mid-point in the same area as the vertical stabilizer separation. The tube displayed a gentle aft bend along the length and was flattened at the separation. The separations were clean with sharp edges. No corrosion or pre-existing cracks were evident. The lower end of the tube and fitting were separated from the lower aft elevator

control sector. All fasteners appeared to have been secure prior to the separation with no corrosion, loose or working rivets evident. Both elevator control cables were secure to the lower aft elevator sector and continuous to the forward elevator control sector.

The upper portion of the empennage, which consisted of the upper section of the vertical stabilizer, the entire horizontal stabilizer, and elevator, except for the left outboard counterweight section was examined. The upper portion of the aft vertical spar displayed a right bend and twist. The edges of the spar cap displayed 45 degree separations. No indication of pre-existing cracks, corrosion or wear was noted. All fasteners appeared to have been in good condition with no indication of corrosion, working or loose rivets. The elevator freely moved full travel and was secure at all hinge points. The upper portion of the separated push pull tube was found secure. Both sector stop bolts were in place and undamaged. The upper rudder hinge was in place and secure. The elevator trim drum inner shaft displayed an aft extension of four threads which, according to the airframe manufacturer, is consistent with a neutral setting.

The investigative team inspected the MiG aircraft at the Prescott Airport to determine if there was evidence of contact between the two aircraft. No evidence of contact was noted to the MiG.

MEDICAL AND PATHOLOGICAL INFORMATION

The Yavapai County Office of the Medical Examiner determined that the cause of death to the pilot was: Multiple blunt force injuries.

Toxicological samples were sent to the Federal Aviation Administration Civil Aeromedical Institute, Oklahoma City, Oklahoma, for analysis. The results of the analysis was negative for volatiles or drugs. Testing for carbon monoxide and cyanide was not performed.

ADDITIONAL DATA/INFORMATION

Radar data from the Seligman, Arizona, RADES facility depicted the MiG in a right-hand turn. The Cheyenne joined up with the MiG on the inside of the turn and descended from above the MiG to below it by about 100 feet. The Cheyenne's flight path matched that of the MiG and its last radar return with altitude information depicted both aircraft at 7,900 feet msl at 1346:47.

A Canon camera was found in the wreckage. The camera was severely heat distressed, however, it was sent to the NTSB Vehicle Recorder Division's Audio Laboratory Washington D.C. for data recovery. The Data Recovery Specialist reported that no image data was recovered due to the severe heat exposure of the memory card.

The Piper PA-46 Pilot Operating Handbook indicates that on the right side, the third window aft of the windshield is a 25 by 19 inch combination window/emergency exit which can be removed inward after pulling the release above the window.

The wreckage was released to the owner's representative on August 15, 2007.

Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	40, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1	**Last FAA Medical Exam:**	09/01/2006
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	4363 hours (Total, all aircraft), 4088 hours (Pilot In Command, all aircraft), 85 hours (Last 90 days, all aircraft), 7 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N121CS
Model/Series:	PA-42	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	42-8001032
Landing Gear Type:	Retractable - Tricycle	**Seats:**	9
Date/Type of Last Inspection:	05/01/2006, AAIP	**Certified Max Gross Wt.:**	112000 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo Prop
Airframe Total Time:	5317.9 Hours at time of accident	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	Installed, not activated	**Engine Model/Series:**	PT-6A
Registered Owner:	Flying Moose LLC	**Rated Power:**	
Operator:	William Friedman	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	PRC, 5045 ft msl	**Distance from Accident Site:**	16 Nautical Miles
Observation Time:	1353 MST	**Direction from Accident Site:**	205°
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	Variable	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.08 inches Hg	**Temperature/Dew Point:**	14°C / -8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Prescott, AZ (PRC)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	VFR
Departure Time:	1345 MST	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	4 Fatal	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-Ground
Total Injuries:	5 Fatal	**Latitude, Longitude:**	34.880278, -112.253333

Administrative Information

Investigator In Charge (IIC):	Nicole L Charnon	**Report Date:**	09/27/2007
Additional Participating Persons:	Michael E Brown; WP-FSDO-Scottsdale, AZ; Scottsdale, AZ Michael McClure; New Piper Aircraft; Vero Beach, FL		
Publish Date:	08/07/2009		
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		