National Transportation Safety Board
Aviation Accident Final Report

Location:	ENNIS, TX	**Accident Number:**	FTW98FA092
Date & Time:	01/10/1998, 1427 CST	**Registration:**	N556BW
Aircraft:	Aero Commander 500-B	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

After departing on an IFR flight in VFR conditions, the flight had been cleared to climb from 3,000 to 4,000 ft, when the right engine lost power. The pilots diverted toward an uncontrolled airport, secured the right engine, & cancelled their IFR clearance. They made an approach to land on runway 15, then attempted a single engine go-around. During the go-around, the airplane yawed/rolled to the right in what the passenger believed was a Vmc roll. It then struck power lines & crashed in a right wing low attitude. Investigation revealed that both pilots held multi-engine ratings. The owner said the pilot (PIC) had flown the airplane for a short time on 12/21/98; however, no other record was found to verify that either the pilot or copilot had flight experience in this make/model of airplane. Examination of the wreckage revealed evidence that the flaps were retracted, the landing gear was in transit, the left propeller was operating with power, & the right propeller was feathered. The airplane had a history of fuel flow fluctuations in the right engine. The diaphragm (P/N 364446) in the right engine distributor valve assembly was found ruptured. It was an old style diaphragm, which was colored black. Bendix Service Bulletin RS-76, issued 11/15/80, called for replacement of the black diaphragm with a red fluorosilicone diaphragm (P/N 245088) at overhaul. The engine was overhauled in June 1992. During maintenance in December 1997, both fuel system injectors & nozzles were tested; however, the distributor valve assembles were not tested. Calculations showed the airplane was loaded 116.3 lbs over the maximum allowable gross weight & 1.3 inches forward of the allowable CG range.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: failure of the flight crew to maintain minimum control speed (Vmc) during go-around from a single-engine approach, which resulted in loss of control and collision with power lines and the ground. Related factors were: a ruptured diaphragm in the distributor valve (flow divider) of the right engine's fuel injector system, which resulted in loss of power in the right engine; inadequate maintenance; a failure to comply with Bendix Service Bulletin RS-76; the airplane's excessive gross weight and forward center-of-gravity (CG); and both pilots' lack of experience in this make and model of airplane.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CLIMB - TO CRUISE

Findings
1. 1 ENGINE
2. (F) FUEL SYSTEM,FUEL FLOW DIVIDER/DISTRIBUTOR - RUPTURED
3. (F) MAINTENANCE - INADEQUATE - OTHER MAINTENANCE PERSONNEL
4. (F) MAINTENANCE,SERVICE BULLETIN/LETTER - NOT COMPLIED WITH - OTHER MAINTENANCE PERSONNEL

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: GO-AROUND (VFR)

Findings
5. PRECAUTIONARY LANDING - INITIATED - FLIGHTCREW
6. GO-AROUND - ATTEMPTED - FLIGHTCREW
7. (F) AIRCRAFT WEIGHT AND BALANCE - EXCEEDED - FLIGHTCREW
8. (C) AIRSPEED(VMC) - NOT MAINTAINED - FLIGHTCREW
9. (F) LACK OF TOTAL EXPERIENCE IN TYPE OF AIRCRAFT - FLIGHTCREW

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - UNCONTROLLED

Findings
10. OBJECT - WIRE,TRANSMISSION

Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT:

On January 10, 1998, at 1427 central standard time, an Aero Commander 500-B twin engine airplane, N556BW, owned and operated by MGS Corporation of Laredo, Texas, was destroyed following collision with terrain while executing a single engine go-around. The private pilot, who was seated in the left seat, and the instrument rated commercial pilot, who was seated in the right seat, were fatally injured. A pilot rated passenger seated in the cabin received serious injuries. An instrument flight plan was filed for the Title 14 CFR Part 91 personal cross country flight, that originated from the Lancaster Municipal Airport, Lancaster, Texas, at 1415. The flight's original destination was Laredo, Texas; however, it was diverting to Ennis, Texas, at the time of the accident.

During personal interviews, conducted by the investigator-in-charge (IIC), witnesses reported that the airplane entered a close right base to final entry for runway 15 at the Ennis Municipal Airport. One witness, residing along the final approach path, observed the airplane's wings "rocking" on the approach, and at about 100 feet from the approach end of the runway, the right wing went 45 degrees low and then vertical to the ground. Near the midpoint of the runway length this witness observed the airplane entering a climb with the gear down and the left propeller turning. Another witness, residing along the final approach path, observed the airplane flying south with the left wing low and the airplane weaving back and forth toward the left side of the runway. Subsequently, the airplane flew over the runway, turned right, and descended to the ground.

Several witnesses at the airport, observed the airplane flying to the south at "50 to 75 feet above the ground. The aircraft was in a landing configuration, landing gear down, flaps down and the nose of the aircraft was up approx[imately] 10 degrees, the right engine was feathered, the aircraft was slow on airspeed." The airspeed was estimated between "70 mph and 100 mph, the wings were basically level with maybe just a little left wing low condition. The left engine was not developing full power." The airplane was "sinking." The airplane "banks shallow into the right side and in a full stall to the right." The right wing hit the ground first and then the nose of the airplane.

The passenger reported that he was seated in the rear facing seat behind the right cockpit seat. He wore a headset that permitted him to hear the cockpit voice communications as well as radio communications. The pilot's delayed the departure from Lancaster due to the weather, and the non-flying pilot (right seat) requested a second departure time from ATC. The passenger stated that the flight departed runway 13 on an IFR clearance. The non-flying pilot handled the IFR radio communications with departure control, and the flying pilot (left seat) flew the airplane. During the climb, the airplane was above the clouds approximately 4,000 feet msl, when there was a "surging of the engine followed by a total loss of engine power on the right engine." The pilots conversed about "low fuel flow to the right engine." The non-flying pilot applied rudder pressure and assisted the flying pilot in performing the emergency checklist. The passenger stated that the airplane was not maintaining altitude and the pilots verified and feathered the right engine. Flight in VFR conditions was maintained for the visual approach to the Ennis Municipal Airport.

The passenger further stated that everything "seemed textbook perfect and neither [pilot] seemed overly concerned about anything." As the airplane entered the base to final transition,

the pilots agreed that they did not want to do a go-around. The airplane was aligned with runway 15 at Ennis with the landing gear extended. At a point where it looked to the passenger that they had the runway made for the landing, the passenger turned to a rearward facing position and tightened his seatbelt.

As time passed and the passenger felt that they should have been landing, he turned around and looked forward. He reported that the airplane was over halfway down the length of the runway; however, not aligned with the runway. The airplane was about 30 degrees to the right of the runway and aligned with the hangars. The "airspeed felt quite slow and we did not appear to be more than 40 feet agl." The flying pilot said "at least I can get the gear up" and he began to raise the landing gear handle. Within a fraction of a second after the gear handle was raised, the nose of the airplane pitched up approximately 10 degrees. Before the passenger could turn back facing rearward, the "left wing started up in what I believe to be a Vmc roll." The airplane rolled to the point that the wing was perpendicular to the ground before the first of two impacts. The airplane came to rest inverted. The passenger released his seat belt and exited through the passenger door. The passenger walked toward the road where he was encountered by a fire department medic responding to the site. The passenger stated that he "heard no conversation and saw nothing to indicate why we did not land before we were out of airspeed, runway, and altitude."

The passenger further stated that the fuel flow gauge was fluctuating during the inflight "surging of the engine." Acquaintances of the pilots, at the Lancaster airport, reported that the flying pilot was going to fly the airplane to Laredo, Texas, following maintenance repair of the left wing fuel tanks and the magneto timing. Due to the instrument weather conditions in the vicinity of Lancaster, the non-instrument rated pilot asked the instrument rated pilot to go on the flight and handle the IFR communications and procedures.

PERSONNEL INFORMATION:

The flying pilot was a non-instrument rated private pilot with single and multiengine land ratings. The pilot was issued a third class medical certificate on April 2, 1997. On the medical application, the pilot's total flight time was shown as 1,550 hours with 15 hours in the previous 6 months. According to the owner of the aircraft, the private pilot flew the airplane for "maybe 10 minutes" on December 21, 1998, during a maintenance flight check. No additional information on the pilot's flight time in the make and model of aircraft could be obtained.

The non-flying pilot held a commercial pilot certificate with single and multiengine land, and instrument ratings. He held a flight instructor certificate with single engine, multiengine, and instrument ratings. The non-flying pilot satisfactorily completed an FAA FAR 135 check ride on November 4, 1997, in the Piper PA-34-200 multiengine airplane. The commercial pilot's logbook indicated a total flight time of 4,833.4 hours through December 28, 1997. The logbook indicated 24.4 hours of flight time in the Piper PA-34-200 multiengine airplane in the previous 90 days. Both pilots held a mechanic certificate with airframe and powerplant ratings with FAA Inspection Authorization.

The pilot rated passenger held a private pilot certificate with a single engine land rating. He owns a single engine airplane and flies regularly from Lancaster to Laredo. He stated that he had 35 hours of dual instruction in an Aero Commander 560-A twin engine airplane.

AIRCRAFT INFORMATION:

The aircraft (S/N 1625-215) was manufactured in 1966. The airplane was imported from

Canada to the United States and issued the FAA registration number of N95BS and a standard airworthiness certificate on May 4, 1992. In 1996, the FAA registration number was changed to N556BW. On March 11, 1997, a pre-purchase inspection and engine run performed at Downtown Airpark, Inc., Oklahoma City, Oklahoma, revealed numerous discrepancies including fuel pressure fluctuations, fuel flow fluctuations, and exhaust stack cracks.

During telephone interviews, conducted by the IIC, the current owner reported that he reviewed the pre-purchase inspection that had been accomplished for the previous potential buyer. The airplane was purchased from Aircenter, Inc., Chattanooga, Tennessee, by the current owner in April 1997, and registered with the FAA on September 15, 1997. The owner's pilot reported that the airplane was ferried to Laredo, Texas. During a flight checkout by the ferry pilot and a subsequent flight to San Antonio, Texas, the owner's pilot "found no discrepancies of note."

The airplane has flown 23.6 hours since the last annual inspection on August 8, 1997. During the 16.6 hours flown by the current owner's pilot, the airplane experienced fuel flow fluctuations on the right engine and sometimes the right engine would not continue to run without the auxiliary boost pump operating. An aircraft maintenance discrepancy log, dated August 25, 1997, listed non corrected discrepancies including low fuel flow, left wing fuel leaks, a fuel shutoff valve leak, and exhaust leaks. The right inboard and aft fuel tanks were removed and replaced, and the fuel lines, screens, and injectors were checked and cleaned at Barker Aeromotive, Inc., Laredo, Texas. The mechanic and the pilot thought that the "debris in the fuel filters and lines could be paint blast media" since the airplane had been repainted. During a telephone interview, conducted by the IIC, personnel at the paint facility, Dan Smith Aircraft, Houston, Mississippi, stated that they painted the aircraft in 1996, and "the chemical stripping process did not involve the use of blast media."

On September 8, 1997, the airplane was flown to Lancaster, Texas, for exhaust system maintenance. During the descent and upon landing at Lancaster, it was discovered that fuel was leaking from the left wing. The aircraft remained at Quinnex where the right and left fuel injector servos and nozzles were removed and sent to J & G Aero Carburetor, Dallas, Texas, for repair, and reinstalled on the engine. The fuel distributor valve assemblies were not removed. Exhaust stacks were removed, repaired by Aircraft Welding, Frisco, Texas, and reinstalled on the right engine by Quinnex.

On December 21, 1997, the owner's pilot returned to Lancaster for the airplane. During the runup for the test flight, the magneto on the right engine "tested just within limits." No other discrepancies were found on the 0.4 hour test flight. Upon the return to the airport, the fuel cells were topped to verify the fuel cell integrity and the "cell failed." The mechanic agreed to re-time the magneto and repair the leak. The left wing fuel cells were removed and replaced with new fuel cells. The fuel drain valve was removed, cleaned, and reinstalled. The magnetos for both engines were re-timed. The airplane was returned to service on December 20, 1997. The owner's pilot was in Florida when the owner arranged for the mechanic to return the airplane to Laredo on the date of the accident.

METEOROLOGICAL INFORMATION:

Witnesses reported the weather in the vicinity of the accident site was 500 to 1,000 feet overcast with 5 miles visibility, and winds 5 to 10 mph from the north. Local authorities recalled haze and fog in the area. The nearest National Weather Service (NWS) surface

observation (METAR), at 1353, at the Redbird Airport (23 nautical miles northwest of the accident site), reported the winds from 330 degrees at 8 knots, visibility 8 statute miles, sky condition 900 feet overcast (variable from 700 feet to 1,400 feet), with a temperature of 45 degrees Fahrenheit, a dewpoint of 41 degrees Fahrenheit. The altimeter was reported as 30.10 inches of Mercury.

COMMUNICATIONS:

A review of air traffic control data and transcripts (enclosed) revealed that the pilot received a weather briefing and filed an IFR flight plan. The flight was cleared to depart Lancaster, Texas, from 1410 to 1415 on the IFR clearance. At 1417, the pilot advised approach control that the flight was airborne climbing to 5,000 feet msl. A transponder squawk (0535) was assigned. At 1418, the aircraft location (radar contact) was 3 statute miles south of the Lancaster airport. At 1423:38, the airplane was cleared to climb and maintain 6,000 feet msl and contact Waco Approach Control on frequency 135.2 Megahertz.

1423:45 The pilot transmitted "we got a problem here ah were gonna drop down we ah we're gonna go VFR we have an engine problem."

Personnel of the ATC Quality Assurance Staff (Southwest Region) reported to the IIC that the pilot's statement "we're gonna go VFR" was a cancellation of the IFR clearance.

1425:04 The pilot transmitted "we got a we're losing fuel flow to the right engine."

1426:27 Radar contact with N556BW was lost and the controller requested the assistance of the Guard Helicopter (N20308) pilot to relay transmissions to N556BW. All further transmissions are relayed through the Guard Helicopter pilot.

1427:24 The pilot reported on a right base for the runway at Ennis.

No additional communications with the pilot were recorded.

AERODROME INFORMATION:

The Ennis Municipal Airport (F41), at an elevation of 492 feet is a non towered airport. The hard surface (asphalt) runway 15-33 is 3,994 feet long and 50 feet wide. The airport is serviced with a VOR/DME-A non precision instrument approach procedure with the approach control facility as Dallas/Fort Worth Regional Approach Control. The Common Traffic Advisory Frequency (CTAF) is 122.9 Megahertz.

WRECKAGE AND IMPACT INFORMATION:

The wreckage distribution path of 278 feet was along a measured magnetic heading of 220 degrees with the final resting site in a wooded field 1/4 mile west of the Ennis Municipal Airport. Power lines paralleled Nesuda Road along the west boundary of the airport. Navarro County Electrical Company personnel stated that the power line poles were 28 feet 9 inches high with a distance of 144 feet between the poles with the top 2 cables at 28 feet agl. Portions of the top 2 cables were found along the wreckage distribution path and at the airplane. The right wing tip light was found in the initial ground scar (57 feet) south of the power lines with the right wing tip at 80 feet from the power lines. One ground scar was filled with a blue liquid consistent with 100 aviation grade fuel. The main wreckage came to rest at latitude North 32 degrees 19.33 minutes; longitude West 096 degrees 39.97 minutes with the airplane inverted at 227 feet from the power lines. The right engine was found beyond the main wreckage. Damage of the airplane components was consistent with a nose low and right bank attitude at

impact. See the enclosed wreckage distribution diagram for additional details.

The cockpit was destroyed with crushing, twisting, and component separation. The cabin section and empennage were crushed and twisted; however, the cabin remained intact. The outboard section of the right wing was separated from the airframe and the right aileron was separated from the wing. Flaps were retracted. The right main landing gear was extended. The left main gear doors were partially closed with the gear retracted into the wheel well. The gear uplocks were unlocked and not damaged. Flight control continuity was confirmed.

The landing gear selector and the flap selector handles were found in the "up" position. The left engine controls (throttle, propeller, mixture) were found full forward at the quadrant. The magnetos had "both" selected for the engines. The tachometer readings were 1,550 rpm and 0 rpm for the left engine and the right engine, respectively.

The airframe and the engines were examined, under the surveillance of the IIC, at the site and at Lancaster, Texas. The left engine and the propeller remained attached to the airframe. Engine continuity was established to the accessory case. There were no anomalies found that would preclude operation of the left engine. The right engine was found separated from the airframe. The propeller was attached to the engine. The crankshaft was rotated and valve action and continuity to the accessory gears was confirmed. When the magnetos were rotated, both magnetos produced spark at all the leads.

MEDICAL AND PATHOLOGICAL INFORMATION:

The autopsies were performed by the Office of the Medical Examiner, Southwest Institute of Forensic Sciences at Dallas, Texas. Aviation toxicological testing was performed by the FAA Civil Aeromedical Institute (CAMI) at Oklahoma City, Oklahoma. The CAMI toxicological findings for the flying pilot were negative. The CAMI toxicological non quantified findings for the non-flying pilot was positive for Atenolol (FAA approved antihypertensive medication) in the blood and liver fluid.

TEST AND RESEARCH:

Fuel system components for the right engine were examined under the surveillance of the IIC. Fuel was supplied to the right engine fuel injector (P/N RS-10B1, setting 391787-4, S/N 399) at 24 psi. Fuel servo pressure to the distributor valve assembly (P/N 2524178-1, S/N TA227-2) was measured at 12 psi. At this point no fuel was being supplied to the fuel nozzles. The distributor valve assembly was disassembled and it was found that the black distributor valve diaphragm (P/N 364446) was ruptured. The diaphragm was not removed from the distributor valve assembly. The distributor valve assembly filter (P/N 367754) was found distorted and contaminated with debris. The debris was forwarded to the Material Analysis, Inc., Dallas, Texas, for examination. Using an exemplary distributor valve assembly, the fuel injector assembly flowed within test parameters. See the enclosed flow bench test sheet for additional details. Bendix Service Bulletin RS-76, issued November 15, 1980, called for replacement of the black diaphragm with a red fluorosilicone diaphragm (P/N 254088) at overhaul.

Debris removed from the right engine firewall filter, the fuel flow divider (distributor valve assembly P/N 2524178-1, S/N TA227-2), and the fuel sump tank was examined by Material Analysis, Inc. A sample of fuel removed from the left fuel tank was evaluated. The samples were also evaluated for possible plastic blast media. The evaluation of the debris samples provided "no conclusive physical evidence to suggest a possible source of contamination in the fuel system which might impede or block the flow of fuel." The debris samples were composed

of "myriad of materials, none of which appeared to be particularly characteristic of blast media." See the enclosed report for additional details.

The propellers were removed from the engines for teardown and examination at Lancaster, Texas. The propeller from the right engine had all of the blades complete and "none of the blades exhibited any significant impact twist deformation nor leading edge damage." The propeller blades from the left engine exhibited bending and twisting with gouges long the leading edges. See the enclosed report for details of the examination.

Weight and balance was calculated by the IIC and the Aero Commander representative. Pilot weights (318 pounds and 253 pounds) and the passenger's weight (193 pounds) were taken from their last medical certificates. Baggage weighed under the surveillance of the FAA inspector at the site was 118 pounds. Airport acquaintances reported to the FAA inspector that the aircraft departed with full fuel (156 gallons, 936 pounds). According to the manufacturer, a 127 pounds per hour fuel rate would equate to an estimated fuel consumption for the flight at 8.47 gallons (50.8 pounds). Maintenance records listed the basic empty weight of the aircraft as 5,099.13 pounds. According to the flight manual, the maximum allowable gross weight of the airplane is 6,750 pounds and the allowable center of gravity (CG) range is 166.0 inches to 174.4 inches. Considering the above data, at the time of the accident the gross weight was calculated at 6,866.3 pounds with the CG at 164.7 inches.

ADDITIONAL INFORMATION:

The airplane was released to the owner's representative.

Pilot Information

Certificate:	Private	**Age:**	53, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	04/02/1997
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	1550 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aero Commander	**Registration:**	N556BW
Model/Series:	500-B 500-B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	1625-215
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	08/08/1997, Annual	**Certified Max Gross Wt.:**	6750 lbs
Time Since Last Inspection:	24 Hours	**Engines:**	2 Reciprocating
Airframe Total Time:	8081 Hours	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	IO-540-E1B5
Registered Owner:	MGS CORPORATION	**Rated Power:**	290 hp
Operator:	MGS CORPORATION	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	RBD, 660 ft msl	**Distance from Accident Site:**	23 Nautical Miles
Observation Time:	1353 CST	**Direction from Accident Site:**	320°
Lowest Cloud Condition:	Unknown / 0 ft agl	**Visibility**	8 Miles
Lowest Ceiling:	Overcast / 900 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	360°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	6°C / 4°C
Precipitation and Obscuration:			
Departure Point:	LANCASTER, TX (LNC)	**Type of Flight Plan Filed:**	IFR
Destination:	LAREDO, TX (LRD)	**Type of Clearance:**	VFR
Departure Time:	1415 CST	**Type of Airspace:**	Class G

Airport Information

Airport:	ENNIS MUNICIPAL (F41)	**Runway Surface Type:**	Asphalt
Airport Elevation:	492 ft	**Runway Surface Condition:**	Dry
Runway Used:	15	**IFR Approach:**	None
Runway Length/Width:	3994 ft / 50 ft	**VFR Approach/Landing:**	Go Around; Traffic Pattern

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 1 Serious	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	JOYCE ROACH	**Report Date:**	12/31/1998
Additional Participating Persons:	LARRY J PRENTISS; DALLAS, TX ROGER J ADERMAN; ARLINGTON, WA GERALD R JAMES; WILLIAMSPORT, PA ROGER W STALLKAMP; PIQUA, OH		
Publish Date:			
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/.		