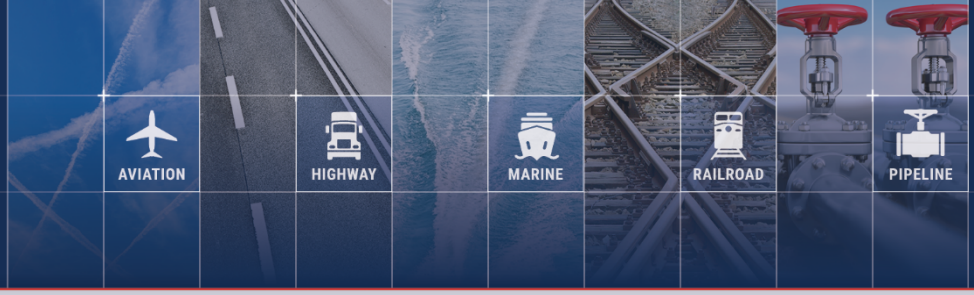

Aviation Investigation Final Report

Location:	ABERDEEN, South Dakota	**Accident Number:**	CHI95LA014
Date & Time:	October 16, 1994, 16:30 Local	**Registration:**	CGJRA
Aircraft:	MOONEY M-20J	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation		

Analysis

THE PILOT STATED THAT THE AIRPLANE'S ENGINE BEGAN TO LOSE RPM NEAR THE END OF ITS TAKEOFF ROLL. HE SAID HE '...HAD NO TIME TO ABORT', AND CONTINUED THE TAKEOFF. AFTER LIFTOFF THE ENGINE'S RPM DROPPED TO 1800 ACCORDING TO THE PILOT. SHORTLY AFTER THE ADDITIONAL POWER LOSS THE PILOT MADE A FORCED LANDING. AN ON-SCENE EXAMINATION AND ENGINE TEST RUN REVEALED NO MECHANICAL ANOMALIES THAT WOULD CAUSE A POWER LOSS. THE MIXTURE CONTROL WAS FOUND ABOUT 1/2 TO 3/4 OF AN INCH AFT OF ITS FULL FORWARD POSITION. THE ELECTRIC FUEL PUMP WAS IN THE 'OFF' POSITION. A FLOW CHECK WAS CONDUCTED ON THE FUEL INJECTOR NOZZLES AND FUEL SERVO. THE INJECTOR NOZZLES WERE FOUND TO BE WITHIN THE MANUFACTURER'S SERVICE LIMITS. THE FUEL SERVO HAD A FUEL FLOW RATE OF 22.2 POUNDS PER HOUR AT THE IDLE SETTING. THE MANUFACTURER'S FUEL FLOW SPECIFICATION WAS BETWEEN SIX AND SEVEN POUNDS PER HOUR. THE PILOT STATED HE MADE THE TAKEOFF WITH THE MIXTURE CONTROL IN A LEANED POSITION.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's failure to assure adequate maintenance was performed on the airplane and the resulting intentional flight with known deficiencies. Factors associated with the accident were the pilot's failure to follow the aircraft flight manual and the improper mixture control setting used by the pilot.

Findings

Occurrence #1: LOSS OF ENGINE POWER(PARTIAL) - NONMECHANICAL
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. FUEL SYSTEM,ELECTRIC BOOST PUMP - SWITCHED OFF
2. (F) MIXTURE - IMPROPER - PILOT IN COMMAND
3. (F) FLIGHT MANUALS - NOT FOLLOWED - PILOT IN COMMAND
4. (C) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - INTENTIONAL - PILOT IN COMMAND
5. (C) MAINTENANCE,SERVICE OF AIRCRAFT/EQUIPMENT - INADEQUATE - PILOT IN COMMAND

Occurrence #2: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - EMERGENCY

Findings
6. TERRAIN CONDITION - OPEN FIELD

Factual Information

On October 16, 1994, at 1630 central daylight time (cdt),a Mooney M-20J, C-GJRA, registered to Allen Spector and Associates of Toronto, Canada, and piloted by a Canadian certificated private pilot, was substantially damaged during a collision with the ground shortly after takeoff from runway 17 (3,863' X 100' dry asphalt) at the Aberdeen Regional Airport, Aberdeen, South Dakota. Visual meteorological conditions prevailed at the time of the accident. The 14 CFR Part 91 flight was not operating on a flight plan. The pilot was the only occupant in the airplane and received serious injuries. The flight departed Aberdeen, South Dakota, at 1628 cdt.

According to the pilot's written statement on NTSB Form 6120.1/2, "After takeoff roll RPM began to drop from 2,600 to 2,200, no time to abort. After takeoff, dropped to 1,800 RPM. Engine surged RPM went up and down." The pilot said the airplane attained an altitude of about 100 to 150 feet above the ground. He said he landed the airplane close to its stall speed.

On October 14, 1994, the pilot experienced a rough running engine after takeoff from the Toronto Island Airport, Toronto, Canada. The pilot returned to the airport and had a mechanic investigate the cause of the occurrence. The mechanic said he found two spark plugs from the number two cylinder and one spark plug from the number three cylinder that were extremely lead fouled. The pilot had the mechanic change the three spark plugs and departed for his destination.

The pilot had a second mechanic look at his airplane upon return from his October 14 trip. An interview with the mechanic revealed he adjusted the magneto timing about two degrees. He said he adjusted the magnetos so there would be a 125 RPM drop during the magneto check before takeoff. The mechanic said he only worked on the magnetos.

The on-scene investigation was conducted by a Federal Aviation Administration Principal Maintenance Inspector (PMI). His examination of the wreckage revealed the following: The flaps were retracted and the landing gear extension handle was in the "DOWN" position. Flight controls were free and correct, throttle was full forward, propeller control was set for "HIGH" RPM, the mixture control was pulled out about 1/2 to 3/4 of an inch from its full forward position, and the fuel boost pump switch was in the "OFF" position. C-GJRA's fuel tanks were full, samples drained from the fuel tanks were a bluish tint and clear.

The PMI stated that C-GJRA's spark plugs were free of electrode contamination. The spark plugs electrodes were black in color. He said a finger compression check revealed compression on each cylinder. Magneto timing was checked by the PMI and found to be set at "0" degrees from top dead center on the number one cylinder. The engine dataplate specifying

the timing was missing. The PMI said engine manufacturer information showed the timing should be between 20 and 25 degrees before top dead center on the number one cylinder. The magneto, a Bendix dual magneto, was inspected and its internal timing was timed in accordance with the engine manufacturer's specifications, according to the PMI. Fuel flow to the engine's fuel servo and injector nozzles was uninterrupted from the left and right fuel tanks when the electric boost pump was activated.

The engine muffler and tailpipe were inspected. Both units had ground collision damage. During disassembly, about 25 percent of the flame tube was found to still be in place. Impacted dirt was removed from the tailpipe outlet. No evidence of flame tube pieces were found in the tailpipe.

The PMI test ran the engine on a test stand. The engine started and ran rough for about one minute before it smoothed out. To get a smooth idle, the mixture control had to be leaned about 50 percent of its travel to the idle cut-off position. At full throttle the mixture was leaned and the engine RPM audibly increased. The fuel servo, distribution block, injector lines and injector nozzles were removed for testing.

Injector nozzles were tested and found to be within service limits as prescribed by the manufacturer. All four nozzles were checked at 10 and 20 PSI. Flow rates ranged between 22.8 and 36.0 pounds per hour. The fuel servo was flow checked, the results of that check revealed that the unit was running rich at idle: At idle the test revealed a fuel flow of 22.2 pounds per hour. According to the manufacturer, the fuel flow should be between six and seven pounds per hour. To obtain the normal idle fuel flow readings the mixture had to be retarded almost to the idle cut-off position. The magneto was bench checked and found to fire at all lead positions.

During the interview with the pilot, it was revealed he had been told by his mechanic to lean the engine as much as possible during taxi, takeoff, and cruise. He was asked if he had the mixture control leaned for the accident flight's takeoff. He said he did, and that the mixture was pulled out a "...good 1/2 inch... ."

A review of the airplane's pilot operating handbook (POH) showed that the before takeoff checklist included the command "Mixture....Full Forward (RICH)." The takeoff procedures checklist showed the electric fuel boost pump's position was "ON" at the start of the takeoff roll and "OFF" after the airplane had begun its initial climb after liftoff. The POH's climb checklist showed that the mixture was to be "RICH (Lean for Smooth Operation at high elevation)." Emergency procedures as found in the POH show a "Full RICH" mixture control for a power loss after liftoff, during climb, and in flight. The checklist showed that the electric fuel boost pump is to be turned on to "High Boost" for a power loss after liftoff and during a climb.

Pilot Information

Certificate:	Private	**Age:**	53,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	February 22, 1994
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	3600 hours (Total, all aircraft), 2800 hours (Total, this make and model), 3520 hours (Pilot In Command, all aircraft), 51 hours (Last 90 days, all aircraft), 15 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	MOONEY	**Registration:**	CGJRA
Model/Series:	M-20J M-20J	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	240894
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	July 26, 1994 Annual	**Certified Max Gross Wt.:**	2740 lbs
Time Since Last Inspection:	18 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3172 Hrs	**Engine Manufacturer:**	LYCOMING
ELT:	Installed	**Engine Model/Series:**	IO-360-A3B6D
Registered Owner:	ALLEN SPECTOR & ASSOC. , LTD	**Rated Power:**	200 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ABR ,1301 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	16:55 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Scattered / 2000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 9000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	60°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	16°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		**Type of Flight Plan Filed:**	Unknown
Destination:	BILLINGS , MT (BIL)	**Type of Clearance:**	None
Departure Time:	16:28 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	ABERDEEN REGIONAL AIRPORT ABR	**Runway Surface Type:**	
Airport Elevation:	1301 ft msl	**Runway Surface Condition:**	Vegetation
Runway Used:	17	**IFR Approach:**	
Runway Length/Width:	3863 ft / 100 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	45.460662,-98.479125(est)

Administrative Information

Investigator In Charge (IIC):	Gattolin, Frank
Additional Participating Persons:	PETER R UNDEM; RAPID CITY , SD GREGORY ERICKSON; WAYNE , IL
Original Publish Date:	February 24, 1995
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=9778