Aviation Investigation Final Report

Location:	BOULDER, Colorado	**Accident Number:**	DEN00LA054
Date & Time:	February 26, 2000, 10:45 Local	**Registration:**	N90MR
Aircraft:	Mooney M-20C	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot performed an extended downwind in the landing configuration with carburetor heat on and the power reduced to approximately 13 inches of manifold pressure. When he turned base to final, his engine began to steadily lose power. Attempts to increase the power were unsuccessful, and the pilot performed a forced landing. The weather conditions were outside of indicated carburetor icing conditions on the chart, but a review of the literature on carburetor icing indicates the unpredictable nature of this phenomenon. The power deterioration of this scenario was consistent with documented examples of carburetor icing. The FAA Flight Training Handbook states in the section under 'Descents (Maximum Distance Glides)' that during 'power-off descents, the engine should be cleared periodically to prevent excessive cooling and fouling.' The engine was test run on the airframe. According to the manufacturer's representative, the engine 'startup was immediate, and the engine ran smoothly.'

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot not following procedures in that he did not periodically clear the engine during an extended glide. The factors were carburetor icing, weather conditions conducive to carburetor ice, and lack of suitable terrain for landing.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: APPROACH - VFR PATTERN - FINAL APPROACH

Findings
1. (F) WEATHER CONDITION - CARBURETOR ICING CONDITIONS
2. CARBURETOR HEAT - SELECTED - PILOT IN COMMAND
3. (C) PROCEDURES/DIRECTIVES - NOT FOLLOWED - PILOT IN COMMAND
4. FUEL SYSTEM,CARBURETOR - ICE

Occurrence #2: FORCED LANDING
Phase of Operation: APPROACH - VFR PATTERN - FINAL APPROACH

Occurrence #3: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER
Phase of Operation: LANDING - ROLL

Findings
5. TERRAIN CONDITION - DITCH
6. (F) TERRAIN CONDITION - NONE SUITABLE

Factual Information

On February 26, 2000, approximately 1045 mountain standard time, a Mooney M-20C, N90MR, was substantially damaged during a forced landing near Boulder, Colorado. The instrument rated commercial pilot and his passenger were not injured. The airplane was being operated by Artell, Inc., of Broomfield, Colorado, under Title 14 CFR Part 91. Visual meteorological conditions prevailed for the cross-country personal flight which originated from Broomfield, Colorado, approximately 45 minutes before the accident. No flight plan had been filed.

According to the pilot, he departed Jeffco Airport and flew to Longmont's airport for a touch and go landing. He then flew to Boulder for more practice landings. The pilot said that he entered Boulder's traffic pattern with a 45 degree track to mid-field downwind. When he got abeam the runway numbers, he pulled on the carburetor heat, reduced the throttle to 13 inches, put some flaps down, and lowered the landing gear.

The pilot said he heard another pilot calling 2 mile final, so he continued flying an extended downwind to runway 26 at approximately 85 miles per hour (mph) while looking for the other airplane. After extending his downwind for approximately 2 miles, the other airplane flew by him on final. The pilot said that as he turned base to final, his engine began to steadily lose power. He checked and verified that his carburetor heat was pulled on, and then decided to go missed approach. He advanced the throttle to full, pushed the propeller full forward, and put the mixture full rich, however, the power continued to drop. The pilot performed a forced landing to a field, and the airplane impacted two fences and came to rest in a large irrigation ditch.

The pilot reported that the temperature at the accident site was 42 degrees Fahrenheit, and the National Weather Service at Jeffco Airport was reporting a temperature of 43 degrees Fahrenheit and a dew point of 3 degrees Fahrenheit during the same time period. Although these weather conditions fall outside the carburetor icing conditions indicated on the carburetor icing chart (see attached chart), a review of the literature on carburetor icing indicates the unpredictable nature of this phenomenon. One source stated that carburetor ice could manifest from 20 degrees to 90 degrees with "high" humidity. Another source stated that carburetor icing could occur from 10 degrees to 100 degrees with relative humidity greater than 20 percent.

The U.S. Department of Transportation FAA Flight Training Handbook states in the section under "Descents (Maximum Distance Glides)" that during "power-off descents, the engine should be cleared periodically to prevent excessive cooling and fouling." The engine manufacturer, in one of their Operator's Manuals, states that "carburetor heat is available only at engine outputs well above idle." The Federal Regulations Part 23.1093, which dictates requirements for airworthiness certification, states that an induction de-icing and anti-icing

system must "provide a preheater which is capable of providing a heat rise of 90 degrees Fahrenheit when the engine is operating at 75 percent of its maximum continuous power."

The engine was test run on its airframe. According to the manufacturer representative, who observed the test run, the engine "start up was immediate, and the engine ran smoothly."

Pilot Information

Certificate:	Commercial	**Age:**	23,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--no waivers/lim.	**Last FAA Medical Exam:**	November 12, 1997
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	306 hours (Total, all aircraft), 2 hours (Total, this make and model), 228 hours (Pilot In Command, all aircraft), 36 hours (Last 90 days, all aircraft), 15 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N90MR
Model/Series:	M-20C M-20C	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	3025
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	October 15, 1999 100 hour	**Certified Max Gross Wt.:**	2575 lbs
Time Since Last Inspection:	92 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4344 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	O-360-A1D
Registered Owner:	AIRBORNE COMPUTER SERVICES INC	**Rated Power:**	180 Horsepower
Operator:	ARTELL, INC.	**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:	BJC ,5670 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	09:45 Local	**Direction from Accident Site:**	150°
Lowest Cloud Condition:	Scattered / 15000 ft AGL	**Visibility**	80 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	15 knots / 20 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	270°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	6°C / -16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	BROOMFIELD , CO (BJC)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	10:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	Rough;Vegetation
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Struhsaker, James
Additional Participating Persons:	JOE JORDAN; DENVER , CO
Original Publish Date:	December 4, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=48666