THE MOUNTAIN FLYING CHECKOUT

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While departing a high density altitude airport at a high gross weight, the Cessna 177RG, with four persons on board, climbed about 50 feet and did not accelerate. The airplane was observed descending before colliding with trees about ½ mile off the departure end of the runway. Weight and balance computations placed the airplane over maximum allowable gross weight. The density altitude was computed at 8,493 above mean sea level. There was no evidence of mechanical failure or malfunction found with the airplane. The departure airport, at 6264 feet mean sea level, is known for its high-density altitude and downdrafts at the end of the departure runway. A review of the pilot's flight experience revealed he had operated at one high density altitude airport in the past, where he accomplished one takeoff and landing with a flight instructor. The probable cause of this accident, according to the NTSB, was the pilot's decision to take off from a high-density altitude airport at an over allowable gross weight condition. Factors in the accident were the high-density altitude, down drafts and the PILOT'S LACK OF FAMILIARITY OPERATING FROM HIGH DENSITY ALTITUDE AIRPORTS.

The pilot's logbook revealed that his only experience operating at an airport with a field elevation over 3,000 feet above sea level was one takeoff and landing at an airport with a field elevation of 3,996 feet above sea level. As a result of this pilot's actions, he and his three passengers were killed.

The Federal Aviation Administration recognizes that mountainous terrain exists in over one half of the continental United States. So, it would seem reasonable that many pilots, at some time, will fly in mountainous, high-density altitude environments.

So, what should we, as flight instructors, do for individuals who come to us and ask for training that will allow them to safely fly in and about the mountainous regions of our country? How should we prepare them for flight into high-density altitude airfields? Surely, none of us would consider one take off and one landing at a high elevation airfield adequate training for pilots that have never flown in that environment.

I get requests for mountain flight training on a regular basis from pilots with varying levels of experience. Most of the pilots, some of whom are student pilots, learned to fly in areas where flight into mountainous terrain was optional and either they did not request the training or their flight instructors did not provide the training.

The checkout should consist of a combination of ground training and flight training that takes at least eight hours to complete. Let's go through the process and detail what training should be provided to all pilots requesting a mountain flying checkout. It is very important that you provide the pilot with a comprehensive training program that will provide the tools necessary to safely fly in and out of high-density altitude airfields and in high-density altitude environments.

Beginning with the basics, the pilot needs to be introduced to the aircraft that will be flown. Whether it is a rental or an aircraft owned by the pilot, complete familiarity with the aircraft is essential.

During the ground training portion, use the aircraft's operations manual and review aircraft performance for takeoff, climb, cruise and landings. Compare the sea level performance with performance at higher pressure altitudes. Compare gross weight performance with weights less than gross and explain that it is recommended that an aircraft taking off from a high density altitude airfield weigh at least ten percent less than gross weight for better performance.

Have the pilot do a weight and balance computation for the aircraft that is going to be used for the training. Do several calculations, loading the aircraft with different combinations of passengers, baggage and fuel. Take the completed weight and balance calculations and, using the operations manual, compute takeoff distance and climb performance for the airfields that you will be departing from and flying to during the flight portion of the training.

Aircraft operation manuals are based upon performance when the aircraft was just out of the factory, with fresh paint and a new engine and a test pilot at the controls. Explain that most take-off and climb performance figures are determined during test flights at airfields that are close to sea level elevations. Explain to the pilot that much of the higher altitude performance figures are interpolated, especially takeoff distances and climb rates. Explain the importance of using the "red knob" to obtain maximum performance from the aircraft engine. Proper mixture is so important for safe operations and proper leaning will provide better fuel burn and better endurance at higher altitudes.

So, this is the time to bring out the KOCH CHART.

The KOCH CHART is used to show what percentages the pilot should add to the aircraft's sea level takeoff distance and sea level rate of climb based upon

temperature and pressure altitude. In other words, the chart takes sea level performance, at standard temperatures and gives the pilot a picture of the aircraft's performance at the density altitude from which the aircraft will be departing.

For example, an airport with a pressure altitude of 6000 feet and a temperature of 100 degrees Fahrenheit would show that the pilot should add approximately 230% to the sea level takeoff distance. The chart would also show that the pilot should decrease the sea level rate of climb by 76%. So, if the aircraft being flown has a normal sea level takeoff distance of 1,000 feet to clear 50-foot obstacle, then the pilot should expect that the aircraft will require approximately 3, 300 feet to clear the 50 foot obstacle. If the aircraft's sea level rate of climb was 500 feet per minute, the pilot could then expect a climb rate of approximately 120 feet per minute. Not very much, but it is a climb. Normally, I instruct pilots to use the "300 foot per minute" rule. If calculations show that the aircraft can not achieve at least a 300 foot per minute climb, then don't fly at that time and wait for the evening or the next morning when it is cooler.

Then show what would happen if the gross weight was reduced by 10 percent. In the case of the Cessna 182R, the weight reduction would result in a decrease in takeoff distance over a 50 foot obstacle of approximately 1000 feet. The climb rate would increase to approximately 500 feet per minute, You can then show the pilot that lighter is really better when operating out of high-density altitude airfields.

The next area of ground instruction deals with chart reading and looking at terrain along planned routes and in the vicinity of airfields. Keep in mind that a straight line is not necessary the best route when flying in the mountains. Explain to the pilot that due to some aircraft limitations, flight over some areas is almost impossible. Therefore, route planning becomes very important. Plan routes so that if an emergency were to occur, the pilot would have an opportunity to land at an airfield, roadway or other suitable area. Have the pilot plan a flight to two or three airfields within a half a days flying time. Calculate aircraft performance for each of the airfields.

Next, take some time to talk about weather in the mountains and how to obtain weather information pertaining to areas where weather reporting stations are non-existent. Explain to the pilot that calling the local radio station, the FBO at the airfield or even the local law enforcement agency can provide weather information that can be useful in planning the flight. Explain how winds aloft can funnel through mountain passes and increase speed dramatically.

Don't forget to talk about the need to carry extra water and other provisions while flying in the mountains. A basic survival kit is highly recommended. It doesn't need to be a large kit, but one that can be carried on board without making an impact on the overall weight of the aircraft. Also,

emphasize that it is important to dress for the destination and carry some warm clothing for those cool mountain nights should the aircraft have to make an off field landing in high terrain.

Prior to commencing the flying portion of the training, have the pilot contact the nearest flight service station, obtain a weather briefing and file a flight plan. It is extremely important to impress upon the pilot the need to file a flight plan as radar service for flight-following may be impossible to obtain due to the mountainous terrain. If the aircraft has to make an emergency off field landing, it is nice to know that 30 minutes after the expected closure time of the flight plan, the FSS will begin looking for the overdue aircraft.

The flight portion consists of cross-country flying to each of the airfields identified during the flight planning phase and doing several takeoffs and landings at each field. As an instructor you should be sure to have the pilot compare performance calculations with actual performance at each of the fields. Explain and show the pilot any specific problems associated with each of the airfields such as an airfield that requires takeoffs and landings in the same direction due to terrain. If an FBO is located at the field, stop and talk with them about specific operations at their field and some of the problems faced by pilots flying into and out of their airfield.

While enroute to each of the airfields have the pilot give “pilot reports” and explain the importance of those reports, especially where there are limited weather reporting facilities. Look for and point out areas that might be considered for an emergency landing. Show the pilot where to expect updrafts and downdrafts and where the pilot might experience turbulence. Explain ways to exit downdrafts and demonstrate for the pilot if a downdraft is actually encountered during the flight. And, don’t forget to have the pilot bring along a camera to record some of the most spectacular scenery in the country. Make the flight portion the natural culmination of the ground planning that was done earlier in the day.

Following the flight portion of the training, grab a cup of coffee or a soft drink and review the flight with the pilot. Answer any questions that the pilot might have concerning the entire day of training.

Select a nice day for the training and make the training a pleasurable experience for the pilot. If the weather for the training day is forecast to be marginal, cancel and reschedule. If you are an instructor who has never flown in a high-density altitude environment and would like to learn more about mountain flying, please schedule yourself for a mountain flying training day with an instructor experienced in mountain flying. Then you can pass along your experience to your students. If you are unfamiliar with mountain flying and unable to take a course then please recommend that your student/pilot schedule a flight with an instructor who is experienced in mountain flying.

As instructors we are responsible for training our students to an acceptable standard of performance. In other words, we do our very best to provide our students with the tools that are necessary for them to fly proficiently and safely. When it comes to high-density altitude training, one takeoff and one landing does not meet any acceptable standard of performance. We must do our part to prevent accidents like the one described at the beginning of this article.

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