Leadplane Training Lesson Plan

Mountain Flying and Weather

03-01-N9065-HO

Objective:

To familiarize the student with mountain flying (Phase I).

To develop the student's proficiency in mountain flying (Phase II).

To familiarize the student with weather sources, to include fire weather sources (Phase I).

To develop the student's proficiency in the use of weather sources and interpreting fire weather information (Phase II).

Content:

Leadplane pilots will be primarily flying in mountainous terrain. It is important to practice good mountain flying techniques and to stay heads up for changing weather.

Crossing ridges at a 45-degree angle is a standard practice when flying in the mountains. This is even more important when flying at the lower altitudes during a leadplane mission. Ridge crossing altitudes should be adjusted for the environment the aircraft is operating in. Adjust the pattern and or altitudes if there are any concerns with down air or turbulence.

Be very aware of flying on the lee side of terrain. The down drafts can create strong turbulence and down air situations. The turbulence will affect the aircraft flight profile as well as the outcome of the retardant drop.

Saddles can give the ability to fly at lower altitudes while flying leadplane patterns. Saddles will also funnel winds, creating up drafts and down drafts on either side of the saddle. Saddles will also adversely affect the aircraft flight profile as well as the outcome of the retardant drop.

Mountainous terrain can influence weather patterns and aid in creating weather that adversely affect flight conditions.

Leadplane patterns should be downhill, down canyon, down sun with the greatest degree of safety in mind. It is critical to plan for reduced performance or emergency situations. When planning patterns and exits in mountainous terrain, allow for reduced performance of the tanker aircraft and not just the lead aircraft. If the tanker or leadplane were to have an engine failure or other emergency that reduces performance, the aircraft must be able to fly the planned profile and exit.

Flying in higher temperatures, during the summer months, and over higher elevation terrain, creates a high-density altitude situation. Higher density altitude reduces engine performance, reduces propeller thrust and reduces lift created by the wing. These factors must be accounted for when planning leadplane profiles in mountainous terrain. Make the first low level passes at a higher altitude to gauge aircraft performance before committing to the normal leadplane flight profile. Evaluate performance changes throughout a leadplane shift as conditions change and affect density altitude.

In turbulent conditions, fly at speeds that are below Va for the aircrafts current weight. Maneuvering speed decreases as weight decreases. Maneuvering speed is only published for max gross weight. The formula for determining maneuvering speed at weights less than gross takeoff weight is:

$$\sqrt{\frac{Current\ Weight}{Max\ Gross\ Weight}} * \ V_A \text{ at Max Gross Weight}$$

At the end of a fuel cycle, Va can decrease to a speed near that of the airtanker requested pattern speeds. This coupled with turbulent air and or poor pilot technique in avoiding asymmetrical G loading can result in aircraft damage.

If turbulence becomes heavy or severe the pilot should attempt to keep the wings of the aircraft near level. Attempting to hold airspeed or altitude creates additional stresses on the airframe. Variations in altitude should also be accepted to minimize stresses on the airframe but at the lower altitudes leadplanes operate at, altitude corrections may need to be made to avoid a CFIT situation.

Mountain waves generate widespread areas of rising and sinking air. The visual signatures of a mountain wave include lenticular clouds, cap clouds and rotor clouds. It is possible for a downdraft to exceed the climb capability of an aircraft at full power. It is also possible for rising air to make it impossible for an aircraft to keep from climbing. Areas of mountain waves must be avoided. If caught in this type of down air situation, turn toward lower terrain and execute a max performance climb. If caught in this type of up air situation, turn away from aircraft that may be above the leadplane and communicate with them.

While in level flight, it is possible to anticipate if the aircraft has enough altitude to clear the next ridge. This can be done by observing the nearest ridge relative to the next ridge beyond. If the next ridge beyond is being obscured more and more as the aircraft is flown towards the nearest ridge, the first ridge will not be cleared at the aircraft’s altitude. If more and more of the next ridge beyond can be seen as the aircraft is flown towards the nearest ridge, the first ridge will be cleared at the aircraft’s altitude.

Microbursts have caused several accidents in general aviation and can cause the same situations, to a greater degree, in the fire environment.

The wet microburst is found in the middle of an active thunderstorm or intense rain shower and avoiding the strong downdraft is relatively easy. The dry microburst, however, is somewhat more deceptive because it occurs with little or no warning in the clear air beneath virga. Dry microbursts are common in and near mountainous areas of the western U.S. in the summer. The formation of the dry microburst is possible with any thunderstorm. If dust is blowing underneath one of these thunderstorms, stay clear until the event passes which can be less than a half an hour in duration. Because down drafts from microbursts can exceed the climb capability of most aircraft, they should be avoided at all cost.

The majority of missions are operated in high density altitude situations and can drastically reduce aircraft performance. It is important to remember that horsepower output is reduced, propeller efficiency is reduced, and a higher true airspeed is required to sustain the airplane throughout its operating range.

A clear understanding of how weather can affect fire behavior and mountain flying is important in the leadplane mission. Knowing current weather in addition to weather outlooks will give a pilot the best overall understanding of conditions. Uses of this weather knowledge include:

- Adjusting tactics to anticipated fire weather and conditions i.e. direct attack, indirect attack, resources needs, etc.
- Choosing correct coverage levels.
- Anticipating factors that will affect density altitude.
- Anticipating winds, thunderstorms, rain, etc.

Completion Standards:

The lesson is complete when the student can demonstrate mountain flying that does not put the safety of flight in question in a training environment for Phase 1 and in a fire environment for Phase 2.

The lesson is complete when the student can demonstrate the use of fire weather sources and apply the information to firefighting activities in Phase 2.

Safety will never be in question and the flying will be accomplished without the reliance on the evaluator.