A pilot of a lightplane set out on a cross-country. It was a perfect day and the flight was going smoothly. Suddenly, the engine started running rough. The pilot made a forced landing in the desert. He was able to survive for five days but rescue didn't come until the seventh.

Another pilot was making his way through a turbulent mountain pass in heavy rain. The pilot was much too preoccupied with navigating the terrain to hear the slight decrease in r.p.m. Normally, he would have detected the warning and he would have taken action, but today the mind and senses were directed to the closeness of the mountains below, worsening weather and the uncer-tainty of his position. The engine r.p.m. dropped a little more, waited a few moments, then the engine quit completely. He crash-landed in a wooded area at an altitude of 8,000 feet and crawled out unharmed. It was a successful landing but the weather turned, almost too quickly, from rain to snow. He managed to live, from all indications, for about three days. Again the tragic news. Rescue came too late on the sixth day.

The brief experiences of these men point up a paradox. Why must a pilot, who is lucky enough to walk away from a crash, perish from the elements? Let us discuss this a little. If you were going on an automobile trip to the mountains in the winter, you would carry a jacket and perhaps other cold weather gear, even though your car had a heater in it. Generally, in the back of your car, you have such things as a jack, spare tire, flares, flashlight and other miscellaneous gear. Then why, in heavens name, wouldn't you carry something in your aircraft just in case you had to get out and walk, so to speak, in

by DONALD V. LYKINS

Surviving In Rough Terrain

some area that you are flying over? To illustrate my point, I watched

a pilot of a single-engine plane file a flight plan from Denver to Salt Lake. He filed VFR direct over some of the roughest country in the United States. I was interested to find out if this gentleman had any survival equipment on board, just in case. When I asked him, he looked at me as if I were someone out of the stone age. "Survival gear. Are you serious?"

After our little talk, I learned the following: He was traveling in a business suit, and carried an overcoat. He carried nothing to protect himself from the bitter mountain cold, such as gloves, heavy shoes, hat, survival kit, nor did he have any idea how to survive if he had to. He did, however, have superb confidence in his aircraft, and indicated that he had never considered the possibility of a forced landing.

Now I will be the first to agree that aircraft built today are excellent in design and dependability, and that the chances are slim that you will be stuck on some mountain top. Nevertheless, with only one engine you must be prepared for this remote eventuality.

Before you were allowed to solo, forced landings were included in your dual instruction. This training was given to you even though the chances that you would have to use the (Continued on page 56)

Here are some things you can do to save your life if you are forced down in the mountains or in the desert. Your survival may depend upon the advance precautions you take

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(Continued from page 28)

instruction were remote. You are a careful pilot. You know how to make forced landings, and you carry insurance on your airplane. Then why not carry a little personal insurance in the form of a survival kit?

In the brief cases of the two men going down, one in the desert and one in the mountains, a gross error was committed by both. Neither filed a flight plan. This is not a mandatory item, it's just good common sense. All right, so there are many times you don't fly airways-you just aim the airplane and go. In that case, all you have to do is mark on the flight plan in the box labeled Route of Flight-"via direct" or "via BUR mag heading 010° PMD 069° BAR 031° LAS." It would help if you called a nearby FAA radio facility occasionally and let them know that you are passing over and your destination. It only takes a second, but you will save searchers many hours and, it may save your life. [FAA's new flight following service is very helpful in such a situation. See On The Airways, Jan. PILOT .- Ed.]

The flight plan serves as insurance —it makes you feel a little more secure that there are people out there looking for you. Now for the matter of surviving the elements until help comes.

Let's arbitrarily divide survival into two categories—mountain and desert, for the two types of regions in the United States in which you're most likely to need survival procedures and equipment. Here are a few suggestions that may help you land safely.

In heavy timber, where you are confronted with landing in the tops of trees, make a slower than normal nosehigh (gear up, if applicable) heading up hill or level, if the terrain permits. If power is available, use it until just before contact. Try to plan your touchdown, as in a normal landing, in the tops of the trees. Avoid lining up the nose on a tree. In rocky or rough country land gear down. The gear will reduce greatly the impact on the cabin area of the aircraft. Again, a slow, full-flap approach. If the area is cluttered with trees, large rocks, etc., attempt to find a clear area. If none exists. nose in between two trees or rocks. The wings shearing will decelerate you much slower than a head-on crash with an obstacle. If you have a shoulder harness, use it. If you have a choice, drag the area well before landing, particularly in snow. Even in snow, land with the gear down. Prior to impact, doors or emergency exits should be opened to prevent occupants being trapped in the aircraft.

Normally, the problems such as I have related above do not exist in a desert landing. The main thing here is to look for a trail, road, signs of habitation and water, and then try to land as close as possible to them. Land gear down, again at the slowest speed possible. Dry lakes generally make good landing fields and sometimes it's possible to find water just below the surface. Dry river bottoms again afford the possibility of water below the surface.

I think the most important thing to remember in a forced landing is to fly the airplane right to the end. The pilot that gives up just before the impact usually ends up much worse off than the pilot who flies his aircraft until it stops or until there just isn't anything left to fly. Your best protection is not hands up in front of your face. It's hands on the controls, making the airplane go where you want it.

Now, you are safely on the ground. Here is what you can do.

ALL AREAS

1. Get away from the aircraft until all danger of fire has passed.

2. Check for injuries and apply first aid.

3. Shock will be present in some degree so try to anticipate it. Relax and look over your predicament. Be calm and plan a course of action. Don't rush around and tire yourself.

4. If the aircraft is intact and you have a radio, try it. Use emergency frequency or frequencies common to the area. If you don't have a radio, then get signaling equipment ready to use at once. You can use pieces of metal from the aircraft, oil from the engine to make smoke fires, bright objects such as seats for reflectors, and gas for fires at night. (Caution: Clear brush away from fire area. Be sure to contain fire or you might be trapped in a brush or forest fire.) Use smoke and reflectors for day, and fire and flashlights, position lights, landing lights, etc., for night.

5. Prepare a shelter to protect yourself from the elements. Check supplies. If you have food and water, ration it.

6. Stay with the airplane until help arrives or until you have prepared yourself for travel, unless you know for sure that you are within easy walking distance of an inhabited area. It is much easier to find a plane than a man walking. If you do leave the aircraft, write a note to arriving rescuers mentioning your intentions, route of travel, etc., and then leave a well marked trail.

In the mountains, summer or winter, don't start hiking until seven days have passed, both because search, on a large scale, has usually been abandoned after this time, and also because seven days gives you time to prepare yourself physically and mentally for a possibly long hike. Bad weather, no flight plan, your position in relation to the flight plan you filed—any or all of these things affect the time needed to find you. After seven days, if help has not come, plan to walk out. Travel only in daylight, taking the easiest way you can find. Travel downstream or downhill as much as possible. Carry any equipment that will aid you in surviving but don't overload yourself. Set up a camp each night well before dark. Set up any signaling devices you have at each camp, and leave a trail. Live off the land by foraging for wilderness foods and save any emergency rations for the time when nothing else is available.

In the desert it's always better to stay with the airplane unless you know exactly how far away civilization is, and you are sure you have the water necessary to reach it. You'll be safer if you estimate the distance and then multiply it by three. Distance is deceptive in the desert. If you do leave, then be sure to leave a note in the airplane as to your intentions. Mark a trail if possible. Strips of fabric, extra clothing, almost anything is suitable. Travel at night in the summer and rest in the shade during the day. Despite these suggestions, your best chance, unless the distance is short, is to stay with the airplane.

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7. Remain in high spirits. This is as important as food and water.

MOUNTAIN WINTER

Keeping warm will be your biggest problem. Avoid frostbite. Avoid sweating as it is dangerous and leads to freezing. Remove unnecessary clothing when working. Don't get chilled. Keep your hands and feet dry. Build a fire by your shelter using wood, aircraft parts, etc. Fuel from your aircraft will assist you in starting it. Never let your fire go out.

SIGNALING TIPS

Disturb the landscape as much as possible. Clear away brush. If in an open area, tramp out S.O.S. in the snow as big as you can, and outline with rocks, branches, etc. Keep snow cleared from upper surfaces of aircraft so it may be more easily seen by searchers. If you are in a grass area, tramp the grass down. Clear the area and make it look as unnatural as possible. Use a smoke fire in daylight and a bright flame at night.

DESERT SUMMER

Lack of water, of course, is your big problem here. Cover your head and neck and get into shade at once. Don't stay in the aircraft. It gets too hot. Sit up off the ground in the shade. It can be as much as 30° cooler one foot above ground than on the surface. If you have water, drink it as you feel the need for it. The only way to conserve your water is to control sweating. Again smoke fires are excellent in the daytime and bright flame at night. If you are in an area that doesn't afford much in the way of burning material, then ready your fire so it can be lit instantly when an aircraft is seen or heard. If brush is available, then put it in piles. You can make a flare from a tin can filled with sand and soaked in gas. Add oil or rubber for smoke in daylight. The mirror is a good desert signal.

DESERT WINTER

In some areas, desert temperatures drop to freezing and heavy rains may occur. Get inside the plane for protection. Collect water anytime it's available. You can use cowling, pieces of fabric, thermos bottle, etc. If you are going to do any cooking, do it outside of the aircraft to prevent carbon monoxide poisoning.

MINIMUM EQUIPMENT FOR SURVIVAL KIT

1. Waterproof matches in sealed container.

2. Multi-purpose hunting knife.

3. First aid kit.

4. Compass (or plan to use the one in the airplane).

5. Three days' rations in sealed container.

6. At least one sealed five-quart can of water in desert.

7. Survival book.

8. Mirror.

9. Adequate clothing for the terrain you are flying over, in case you are forced to leave the comfort of the cabin.

Survival is largely a matter of using your head. The suggestions I've set down here can only be used once you're calm, in control of the situation and ready to think about surviving. Remember, you're not the first to go through such an experience and you won't be the last. END

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THE AUTHOR

Donald V. Lykins is a pilot for Western Airlines and a member of the Air Safety Committee for the Air Line Pilots Association. He has had more than nodding acquaintance with survival in rough country as a result of spending seven weeks in the barren regions of Alaska as a paratrooper testing cold weather equipment and survival methods. He is as familiar with lightplanes as he is with airliners and has been checked out in some 39 aircraft in all.

Dornier Planes May Come To U.S.

H ere's the West German DO-28, whose fame in the United States seems to have increased since it appeared on The PILOT'S February cover. It is still basically the DO-27 [see PILOT, May 1960] with the addition of another engine. The engines have been placed outboard of the stub wings and radio gear is now housed in the nose. The second prototype (shown) is powered by two 250 h.p. Lycoming 0-540-AIA engines.

Howard Levy, who photographed both the February cover and the picture below, supplies the following data: Wingspan is 45 feet 3½ inches; length 29 feet 8 inches; top speed 170 m.p.h.; cruising speed 161 m.p.h.; range 744 miles; landing run to clear 50 feet is 705 feet; takeoff run to clear 50 feet is 902 feet; empty weight, 3,615 pounds and gross weight 5,137 pounds.

The DO-28 seats six, as does the DO-27. Five have so far been delivered to South Africa's Protea Airways and others to a number of European short haul operators. This twin sells for about \$40,500 and further information can be obtained from Dornier-Werke G.m.b.H., Muenchen, Sales Department, Brunhamstr. 21, Munich-Neuaubing. Levy reports both the DO-27 and DO-28 will be brought over to the United States for demonstrations, but no word has yet been received on the date. The company is also developing a near-VTOL version with tilting propellers, designated as the DO-29. END

Dornier D0-28 has the basic design of the D0-27 single-engine model with twin engines placed outboard of the stub wings Photo by Howard Levy

