by HENRY COMBS

THAT BEAUTIFUL MOUNTAIN AND HER SINISTER TRAP

A Possible Explanation For Some Unexplained Ridge-Soaring Crashes

That Saturday morning, May 26, 1984 was especially pleasant in the Antelope Valley north of Los Angeles, California. The preparations for our upcoming flight were like many others over the years. We were all enthused, and pleased over the prospects—Robert Nethercutt, Chet Lyman and I had no idea of what was in store for us on this particular Fateful Day.

Chet was anxious to go first and explore for lift early in the day. We often referred to him as our "sniffer" for lift. In his beautiful *Phoebus* A he could work weak lift with amazing success. His wife, Violet, was his crew and we both helped him get ready for the takeoff. I pulled his seat belt and shoulder harness up nice and tight. He started tow at 10:36 a.m. from Crystalaire airport near Pearblossom, and released at the normal departure point along the San Gabriel Mountains. At 10:46 he called me, as I awaited tow, and said that he had 200 fpm lift on the north face of the mountain. I started my takeoff at 10:57 a.m. and was towed to the same departure point, where I released at 10:57. I did not see Chet's *Phoebus* anywhere.

A few minutes later Chet's ground crew called him and received no response. I could not see him, and I thought he ought to have been visible. Then I called him, with no response. This was not like Chet at all.

Then some overpowering Guidance caused me to return to the field. On the way in I called on the radio and outlined the problem. They had George Thomas in a towplane ready to search by the time I landed. We took a portable radio, took off and made one left turn toward the mountain. As though an unseen power was guiding us, we flew an almost straight course to the crash site at the 6700-foot level on the north face of the mountain. There lay the twisted and torn wreckage of what used to be a very beautiful *Phoebus* A. The terrain was exceedingly steep and it was difficult to make out the details amongst the pines as George and I passed over it repeatedly . . . and then, on one pass over we saw an arm wave to us! You can imagine our emotions!

The only possibility of rescue would be by helicopter, which we already had called for upon spotting the wreckage. The Los Angeles County Sheriff's Rescue Unit went into action. Paramedics were dropped in from smaller helicopters, then the primary rescue helicopter—a Sikorsky s-58 flown by Roger Peterson—made the expert and daring recovery of Chet Lyman. He was on board approximately two hours from the time he crashed, and was flown directly to the Antelope Valley Medical Center in Lancaster where he lingered close to death for four weeks in the intensive care unit. His progress is a tribute to his excellent physical condition before the accident and his very determined spirit, together with the excellent medical care he has received. Of course, his loving wife and crew, Violet Lyman, is ever present at his side.

I can count several friends and acquaintances who have been either killed or severely injured on sailplane flights which ended on a mountain. All of them were good sailplane pilots. Why did it happen to them? Did they finally make that one mistake? Or can it be that the mountain *sets a trap which will put any sailplane out of control?* I believe in the trap theory. Coincidence may keep the pilot out of it for a long time, even years. But years of success flying in the mountains, up close to the rugged terrain, breeds false confidence that all is well, until that one time when you coincidentally fly into the mountain's trap.

This trap the mountain sets is invisible and transient. In order to visualize the phenomenon, let's start with a study of a vigorous thermal where it originates near the surface over flat terrain as shown in **Figure 1.**

A sailplane approaching the thermal often will encounter strong sink just before flying into the thermal. All of us pilots are familiar with this phenomenon, and many of us have experienced a turbulence that has raised one wing to a near-vertical position, with the tail high. This has happened in spite of full corrective control, and has meant recovery with a pull-up.

Note that the lower the flight path is, the greater will be the difference between the lift on the left wing and the sink on the right wing, should we encounter the edge of the thermal. This can be a deadly situation, and has led some of the best pilots to recommend that dust-devil thermals *not be used* without at least 400 feet of ground

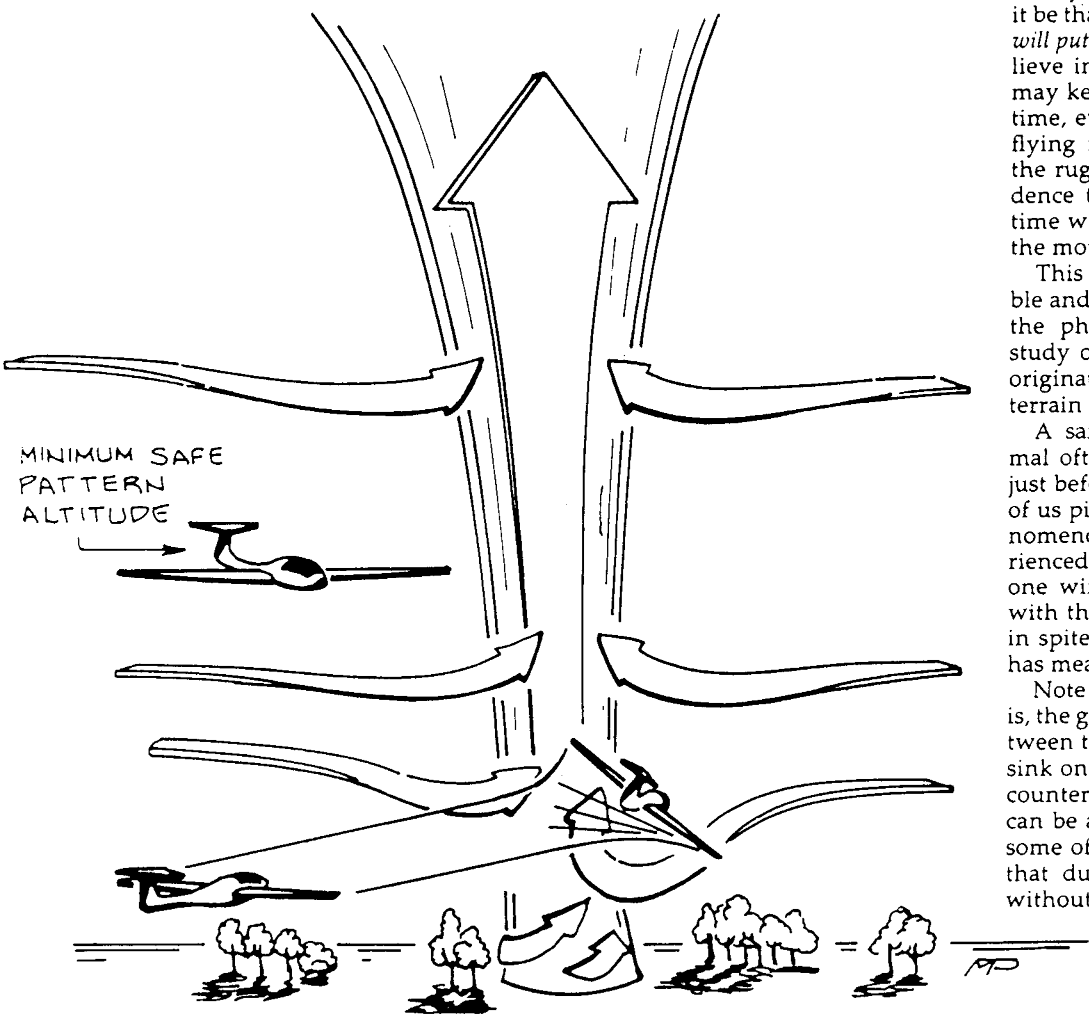

Figure 1.

Illustrations by Mike Pohlig

clearance and a speed high enough to take care of horizontal shear effects on indicated airspeed.

We have all been schooled as to the dangers of shopping for a thermal at very low altitudes. This training, and our desire to save pattern altitude for adequate landing preparations, has kept most of us from exposing ourselves to this invisible trap close to the ground over flat terrain.

But how about flying along a mountain slope when there is potential for thermals? There is all that ground clearance just 100 or 200 feet over to one side, even though our opposite wing may be cruising along close to the trees or rocks. After all, we can merely roll and peel away from the slope any time we need to, can we not? Right, most of the time. In fact, it works so well for years and years that we come to believe this kind of flying to be a safe practice. We've done it over and over, and we haven't been killed yet.

For those of you who still fly this way, best take heed. You have not yet encountered that beautiful mountain's sinister trap, where the hidden turbulence will roll the sailplane *toward* the mountain and pitch the nose down, overpowering all the control authority available on our modern sailplanes. This means that we can't carry out our good intention of peeling away from the slope, and we are trapped. Only enough ground clearance to permit recovery will save us from either a high-speed ground impact or a stalling, spin-in condition.

In order to better appreciate this sinister trap of the mountain's, we can redo and extend the analogy of thermals originating on flat ground, and compare them to those spontaneously erupting from a steep mountain slope, as illustrated in **Figure 2**.

The hazardous situation we saw in Figure 1, over level ground, becomes very much accentuated in the region where the air feeding into the base of the thermal rushes *down* the mountain and then very abruptly is sucked into the vertically rising core of the thermal. The condition which was serious on level ground becomes deadly on a steep mountain slope uphill from the base of the thermal.

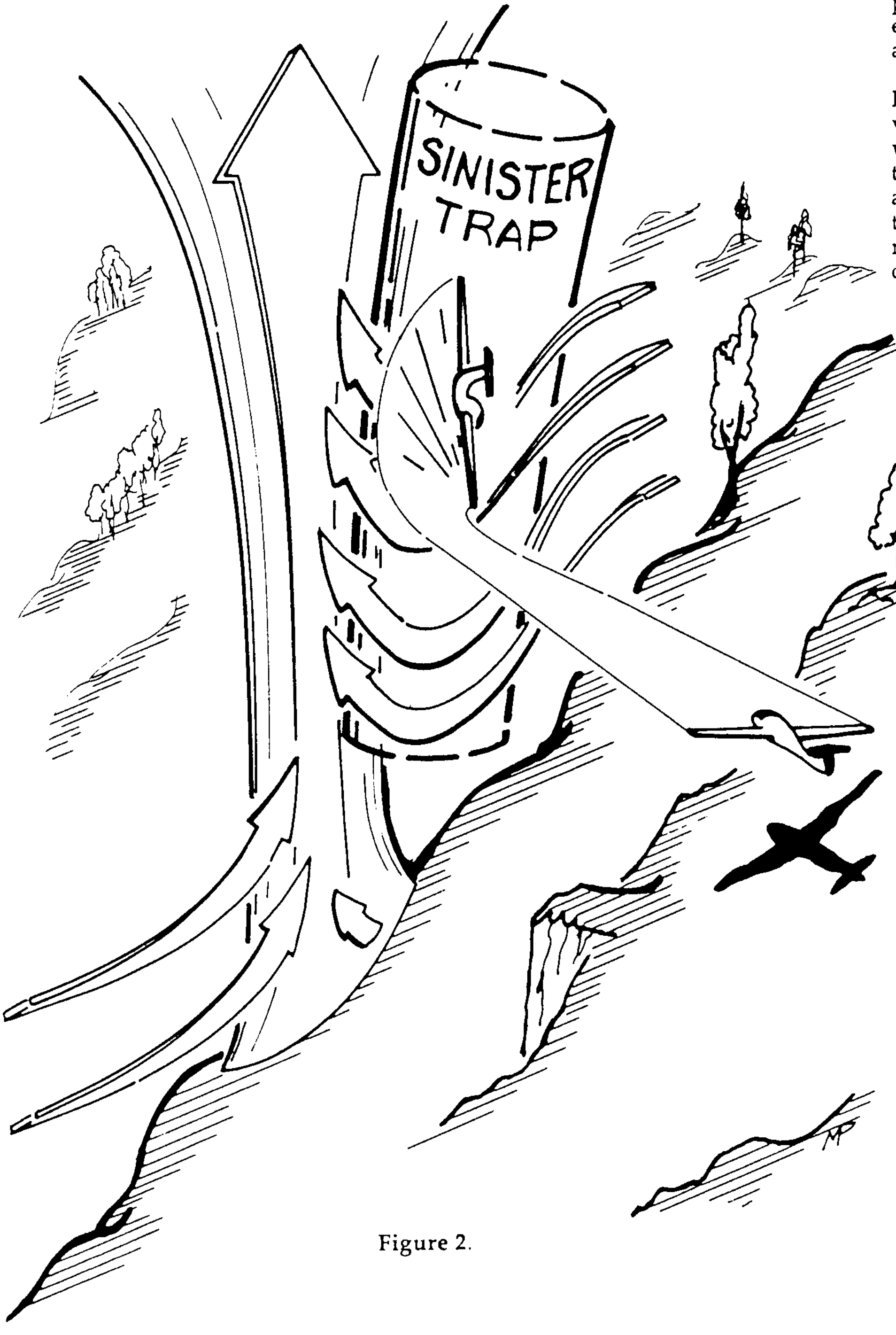

Figure 2.

A few numbers on the theoretical roll capability of any of the sailplanes we fly today will show that a thermal of 500 fpm (or perhaps even less) under one wing is more than we can handle with ailerons, even without possible downdrafts on the opposite wing. A hazardous attitude is bound to occur: we will be tail-high and banked vertically toward the mountain, and only enough ground clearance and expert airmanship will save the day!

Consider our chances for encountering the mountain's sinister trap:

1. There must be a young, vigorous thermal in progress.

2. We must fly into the very local region on the uphill side of the thermal, where the downrush of air feeding the base is very close to the air moving vertically upward inside the

thermal. Chances are that flying one wingspan to the left or right would be enough to avoid the upset.

3. The thermal is invisible and if we encounter it outside the very local trap region we will probably pat ourselves on the back for having so expertly found lift. But if we do hit the trap squarely, the mountain may win.

The chances of encountering the trap really are quite small for any one occasion. This fact builds false confidence that I suspect is at least partially responsible for a great portion of the so-called "unexplained" sailplane crashes in mountains.

Recommendations

1. If the atmospheric conditions suggest that thermals may be generated along the slopes, *stay far enough out* to permit recovery from a sudden and uncontrollable upset toward the mountain with wings vertical and tail high.

2. Evaluate, plan and *train* for the technique that you will use should the mountain spring her sinister trap on you. I recommend a maneuver as follows to escape with minimum ground clearance loss (see **Figure 3**):

First, dump the stick forward as an immediate reaction, so as to reduce the stalling speed and simultaneously go away from the slope. This will be a reduced-g or even slightly negative-g maneuver. Then, while your load factor and therefore your stalling speed are reduced by the zero or slightly negative angle of attack, roll the top wing down with the ailerons. Use coordinated rudder during the rollout. Complete the rollout headed *away* from the mountain.

3. *Remember* that the thermal lift will be more workable at higher ground clearances aboe the origin. In other words, select a thermal that has "popped off" lower down the mountain slope. If none exists, go home and fly again another day.

4. Even on days when there are no thermals and the only lift is ridge lift, it is noted that the slowing effect of ground friction on the air mass flowing up the mountain means that the best lift is out far enough from the slope to be free of this surface shear effect.

5. MORAL: when flying, give that mountain her distance, and enjoy her beauty forever.

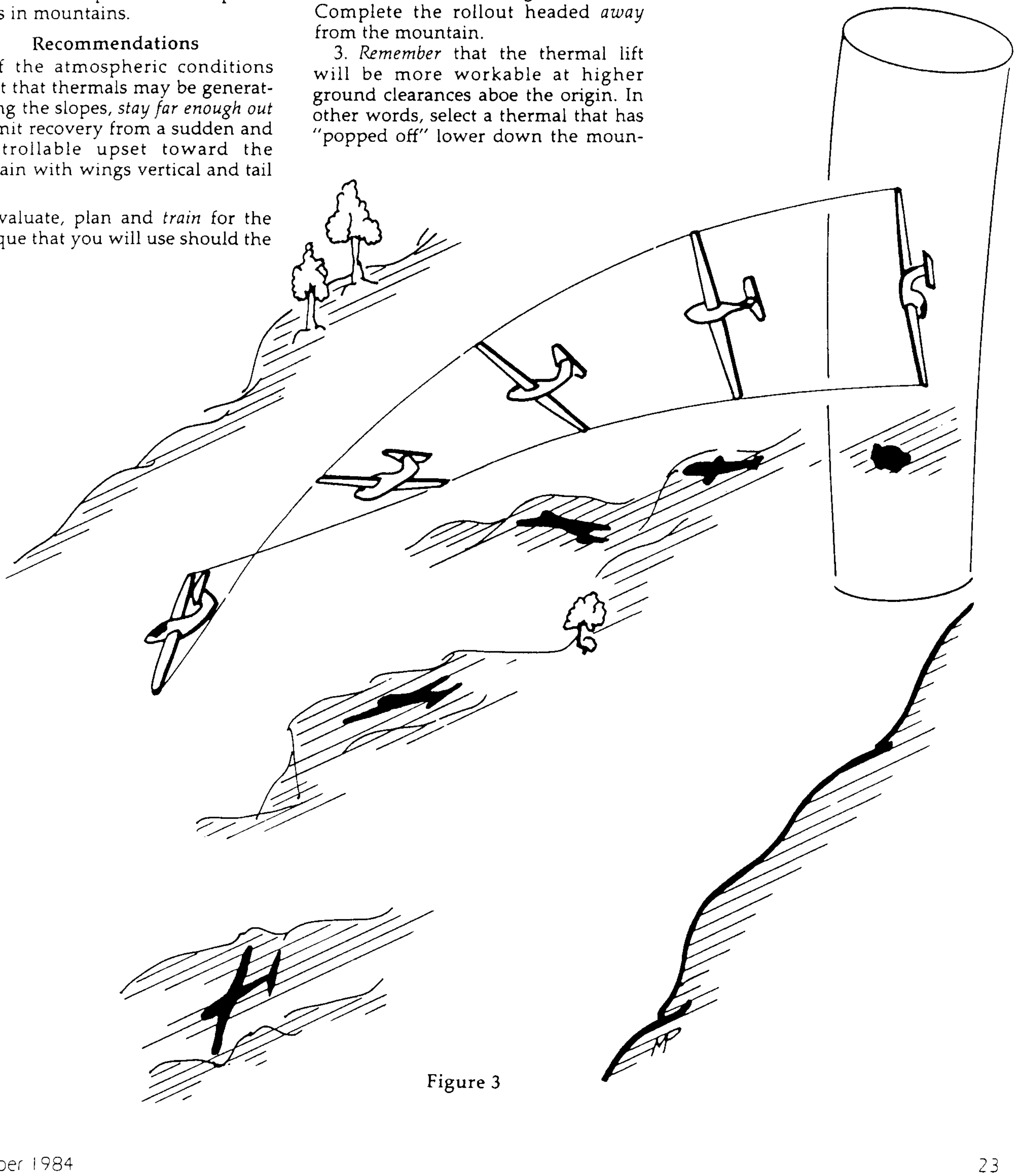

Figure 3