

(The poet William Wordsworth thought highly of "emotion recollected in tranquillity." We tend to think it's better when recollected in *Soaring* magazine, as in this example by the holder of U.S. Silver Badge 105, Gold Badge 273 and Diamond Badge 289. —Ed.)

Photographs of lee waves taken by Philip Wills in New Zealand as well as those by Bob Symons at Bishop, California, are enough to give any soaring pilot wave fever. Encouraged by the desire to learn more about the phenomenon, I did encounter wave circulation on two occasions while flying out of Wurtsboro, New York. By Sierra and Rocky Mountain standards, these were puny. The basic characteristics were there, however: the turbulence at lower levels and the superlatively smooth lift at higher levels. The pump was primed, so to speak. In order to study the circulations from the ground, I embarked on a perpetual study by means of time-lapse photography. The results were very revealing regarding the anatomy of the wave.

My job required a move of the household to Boulder, Colorado, in 1965. The backbone of the Rocky Mountains sweeps eastward to within 30 miles of the western outskirts of that city, peaks rising more than 14,000 feet above sea level, 11,000 above the ground. One of the first sights that greeted us, upon arrival, was a huge stack of lenticular clouds over the Continental Divide. Pressure of work and the details of establishing the household at the new location delayed the man-to-wave meeting for several months, but the potential was abundantly evident. Winch tows of my Schleicher K-8 utilized thermal lift to the vicinity of 12,000 feet AGL, at which point it was possible to enter wave lift extending parallel to the foothills escarpment. The knowledge gained from viewing my time-lapse films was of great value in actually working the wave.

On May 22, 1966, the late Dave Johnson and others of the Black Forest glider operation held a wave camp at Westcliffe, Colorado, a small mining town some 50 miles west-southwest of Pueblo. Westcliffe lies in a broad grassland valley, bounded on the west by the magnificent Sangre de Cristo mountain range 10 miles distant and on the east by the Wet Mountains. Average height of the mountain tops above the valley floor is 8000 feet. The range extends from Salida to Santa Fe, New Mexico, on the south. The remarkable aspect of this range is that it rises out of an extensive plain flanking both sides, east and west.

The waves as gold

by LOU FEIERABEND

By the time our group arrived at the airstrip, both winch and aero tows were in progress. The sky was a deep blue, with no trace of cumulus activity at our 9:00 a.m. arrival time. My plan was to get away on an ambitious cross-country flight specifically aimed toward completing my Gold soaring badge and, possibly, adding one of the coveted Diamonds.

Others were having no problem staying up. We agreed that my partner, "Rip" Van Winkle, should go up for a guinea-pig flight. Rip was towed off at 10 a.m. and immediately caught hold of good thermal lift. By this time the sky was spotted with a sprinkling of cumuli. Rip called back that he was working 700 to 900 feet per minute "all the way around." One simply does not tear a fellow away from something like that, so I told him to stay up as long as he wanted, I would take my flight the next day. He landed three hours later, having easily achieved Gold Altitude—but for naught! We had forgotten to turn on the freshly smoked and wound barograph! Oh, well, better luck next time.

Following his landing, I took a short flight toward the end of the day, got to cloud base and discovered some patchy lift, possibly rotor, in the vicinity of the hills. That evening we had a dinner rendezvous at the deWesse Lodge where we ate steak and talked about this wonderful soaring site.

Sunday morning dawned beautifully clear, except that a monstrous rotor lay in the lee of the range. It apparently extended the whole length from Salida to as far south as we could see. I would have gladly bypassed breakfast, but others of our party vetoed the notion. I bolted my breakfast and waited

as fast as I could for the others to finish. Towing was already in progress on our arrival at the airstrip. Some sailplanes were in the air. A few had landed, having released in a bit of local turbulence associated with the main rotor circulation. Dave Johnson towed a Schweizer 2-32 aloft. Shortly after release the pilot came on the air, reporting "One thousand feet per minute," and a few minutes later he radioed, "Just passed twenty thousand." Wind velocity at ground level varied from zero to 30 mph in gusts.

I had declared my Goal: Cheyenne, Wyoming, figuring to fly the course along the Sangre de Cristos to Salida, then move downwind to Colorado Springs, then north along the Rampart Range, utilizing thermal lift, to Fort Collins. From there thermals would take me downwind to the Cheyenne Municipal Airport, my destination. The trip was calculated to take about six hours. The K-8 is definitely not a racing craft: stay up, it can; go fast, it can not!

Towline was attached and Dave towed us out. Crossing the open valley, we reached the rotor and gradually increasing lift and turbulence. At least one area of minor lift was encountered enroute that might have been mistaken for the real thing, but Dave had warned me, prior to takeoff, not to release until he waved me off. As we moved past the leading edge of the rotor, the towplane shot up at an astonishing rate. A few seconds later the K-8 encountered the updraft, putting the rate-of-climb pointer against the stop pin at 2000 fpm. The release knob was pulled, the towline recoiled.

Now out in the clear sky, the stick was pushed forward to establish a

shone and sparkled and diamonds...

As K-8 and friends get ready at Westcliffe, traces of roll cloud on the Sangre de Cristos in background testify there will be wave today.

"glitch" on the barogram trace as witness to the release. In a matter of moments all turbulence ceased and we were in that superlatively smooth air which is the signature of the wave. There was a short, busy period arranging maps and getting other house-keeping items put in order. The "hundreds" hand of the altimeter was rotating at an astonishing rate. Due to increasing wind speed at the higher levels, we drifted a bit downwind, the rate of climb dropping to "only" 1800 fpm. Lowering the nose to pick up speed for a few minutes of upwind penetration quickly put us back in "good" air again.

The Sangre de Cristos merged into the vast panorama unfolding below, the mountains scarcely noticeable now except for the white patches of the snowfields along the north-facing slopes. The feverish preparations prior to takeoff had not included my camera, but Rip had pushed his Leica into my hands, saying, "It's set at two hundredths at f/8." Now, without benefit of light meter, I began to document the trip. Alas! Rip had exposed all but eight frames.

Approximately three quarters of an hour from release the altimeter registers 35,000 feet, the rate-of-climb still indicating four to five hundred feet per minute. I have been on 100 per cent oxygen for the past 10 minutes. Viewed from this point, the roll cloud extends the whole length of the Sangre de Cristos.

Reality overtakes the narcotic reverie: a task is to be flown, get on with it! Airspeed was pushed up to 65 mph (100 mph, true) and we began to move northwest along the main spine of the mountain range, still climbing at 100



feet per minute on the average. Although Pike's Peak was hidden by cloud, one could locate it by virtue of the lenticular lying above. A long downwind glide was made to Colorado Springs, over Pike's Peak, a beautiful sight some 9000 feet below! The rotor downwind of the peak had a magnetic effect that had to be satisfied. I made a short excursion to check the lift—not as strong as the Sangre de Cristo, but still a respectable 1500 feet per minute.

To the north, rotor clouds formed by the foothills of the Rampart Range

appeared as discreet entities, very unlike the continuous phenomenon at Westcliffe. The wind (250°) was no longer moving at right angles to the ridge. As a consequence a roll cloud, perhaps five to ten miles long, would form at the "right" distance, five or six miles downwind of the escarpment. Then there would be a few miles of "call it what you will", followed by another rotor, quite parallel to the first but displaced upwind of the one presently under observation, again by a separation of five or six miles.

At the end of the rotor on which we

were flying, a diagonal upwind penetration was made to gain the first rotor lying behind the escarpment. Although strong sink was the rule during these upwind penetrations, good lift always was found in front of the new rotor. By this time we had long since passed the FAA Colorado Springs high altitude "window" and avoided the temptation to violate the (then) 24,000 foot IFR level. In this case the limitation was of a benefit, as it induced me to push the K-8 up to 80 mph at times.

All this time a continuous communication was going on with civilization below. For a number of reasons, one of which was cost, we had fitted the sailplane and ground auto with Citizen's Band transceivers. Although one cannot communicate with ATC personnel, except by proxy, with this equipment, one is really in touch with the rest of the world. Due to the devious route my crew had to take to reach Cheyenne we were out of continuous contact. Fragments of my transmissions were heard which left no doubt about the progress of the flight. The CB people along the route had a royal time working "Motorless airborne at twenty-three thousand feet, enroute Cheyenne, pilot on 100 per cent oxygen." Frankly, I was enjoying the event as much as they!

Boulder, Longmont, Loveland passed below. We were still doing our rotor hopping (aerial broken field running, so to speak). An isolated lenticular cloud I had been watching since takeoff was triggered by Long's Peak, west of Longmont. Since I still had some oxygen remaining, I made a short pass in its direction. Like Pike's Peak, it was generating 1500 fpm. At Fort Collins the last of my oxygen supply ran out, something that had been under close scrutiny during the entire trip. Anticipating this, a gradual descent was already in progress to the level at which I did not need supplemental oxygen.

Angling toward Cheyenne, which was now within sight on the horizon, I flew directly downwind thinking about procedures for landing at this controlled airport without the usual communications gear.

Arriving south of the city at 3000 feet AGL, I made a call to "any CB operator who happens to be on the air." Two answered immediately. I asked if either was near a phone; one stated that he was operating from a fixed base. The ensuing conversation went something like this:

K-8: "I'm in a glider at three thousand feet over the south side of the city. I will need per-

mission to land from the air traffic control tower at the airport. I don't have an aircraft radio. Would you be kind enough to give them a phone call, ask them to give me a steady green light?"

CB: "Okay, right away." Then, after a pause of a minute or two, "I keep dialing their number, but get a busy signal. Are you okay?"

K-8: "Just keep dialing their number."

CB: "Still keep getting busy signals. Did I hear you right, are you flying one of those contraptions that's got no engine? Where'd you come from?"

K-8: "Never mind, just keep at the dial. I see a 727 transport in the landing pattern and a couple of other airplanes on the taxiway getting ready to take off. There was some lift a way back; I'll go back there

and wait until the traffic clears."

The lift was located, the K-8 centered, and we quickly climbed through the 3000-foot level.

CB: "I've got the control tower on the phone, you must be pretty low by now, what do you want me to tell them?"

K-8: "Don't worry, I'm well above 3000 feet and climbing. Tell them to allow the jet to land and then let the two waiting aircraft take off. I'll look for a steady green light."

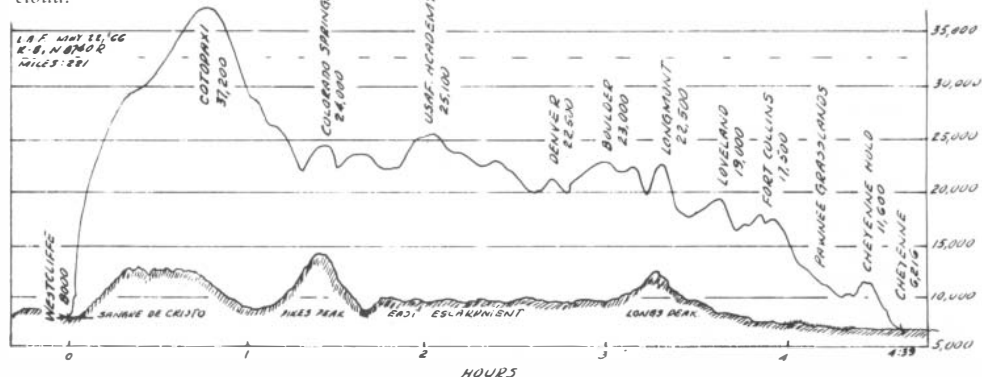
CB: "The tower says Okay, you can start your descent, get into landing pattern for touchdown on runway twenty-seven. Are you kidding me about this no-engine flying machine?"

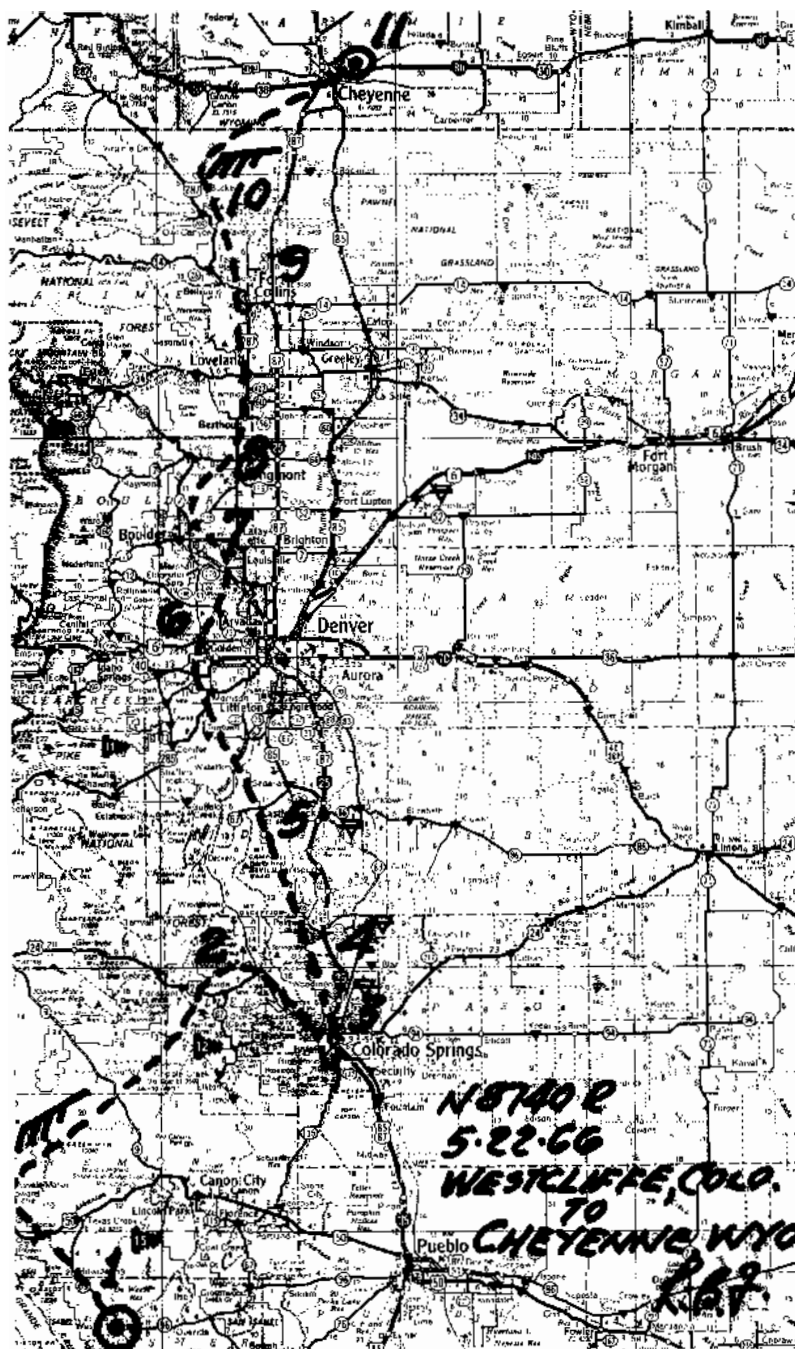
K-8: "Thanks, I'm heading in for a landing. Believe me, no engine."

The awaiting aircraft departed, the steady green light shone. I waggled



The K-8 penetrates poorly, but goes well with a tailwind. Here it is at 21,000 in the Westcliffe wave looking south along the roll cloud.





my wings to confirm and proceeded to land. On the downwind leg there was another transmission:

CB: "Tower says to roll out, cross the taxiway and stop near the base of the tower on the grass. By the way, would you mind if my wife and I came out to the airport to meet you and have a look at your flying machine?"

K-8: "Be my guest."

On the ground, the wind was blowing in a lively manner. I got out of the cockpit and stood with one foot on a wingtip alongside the taxiway. The 727 rolled by, two grinning faces peering out, giving me the "thumbs-up"

sign. After tying the sailplane down I took my paperwork, flight declaration and barograph to the tower for official witnessing of the landing. As I entered I said, "I'm the guy who just landed in the glider out there, and I need a signature as witness to the landing."

Tower Supervisor: "I don't recall seeing a glider land here, did any of you?" Four heads solemnly shook, "No."

K-8: "For gosh sakes, men, this was the most important flight of my life. Come on, you're pulling my leg! You gave me a green light!"

Tower: "Relax, I doubt if anyone on this airport didn't see you

land. The word got around pretty quick. What do you want me to sign?"

K-8: "Here, at the bottom of the declaration sheet, and please note that the barograph seal isn't broken!"

Tower: "Okay," and, holding up his pen and looking me straight in the eye, "this is worth a magnum of champagne, right?"

K-8: "Anything, just sign!"

Tower: "This is the first time we worked a glider. Where did your flight originate?"

K-8: "Westcliffe, hope you didn't mind the land line communication."

Tower: "Cripes, that must be a couple of hundred miles! You could have gotten landing clearance by Pony Express! We pride ourselves on being adaptable to almost any situation; this one was easy. Was there some object to the long flight?"

K-8: "A number of objectives, but most important, I completed the final leg of my Gold Badge and put two Diamonds on it, all in a single flight."

CB (KLE0418) arrived with spouse, examined the K-8 in detail, and said it was a truly exciting experience. In truth, I had to agree.

My crew arrived about an hour after landing. We got all kinds of enthusiastic help in dismantling the bird from a number of observing college students.

The flight taught me a number of things. First, long distance flights are feasible using wave lift if the terrain consists of long mountain ranges together with moderately strong winds normal to the ridges. Secondly, a high sustained cruising speed is possible due to the very smooth airflow and the direct nature of such flights; no circling was necessary except for the "hold" just prior to landing. Thirdly, penetration across discontinuous rotor circulations exacts no significant penalty with respect to altitude loss or diminution of cruising speed. The actual elapsed time versus the straight line distance from goal to destination was nearly sixty miles per hour—not bad for a K-8—and the only downwind legs were from Westcliffe to Colorado Springs and later between Fort Collins and Cheyenne.

Outside temperature was low at altitude (-40°F), but greenhouse effect made the trip bearable: nothing froze!

Bottom line: if you hear of a wave camp to be held at Westcliffe, Colorado, don't miss it!

