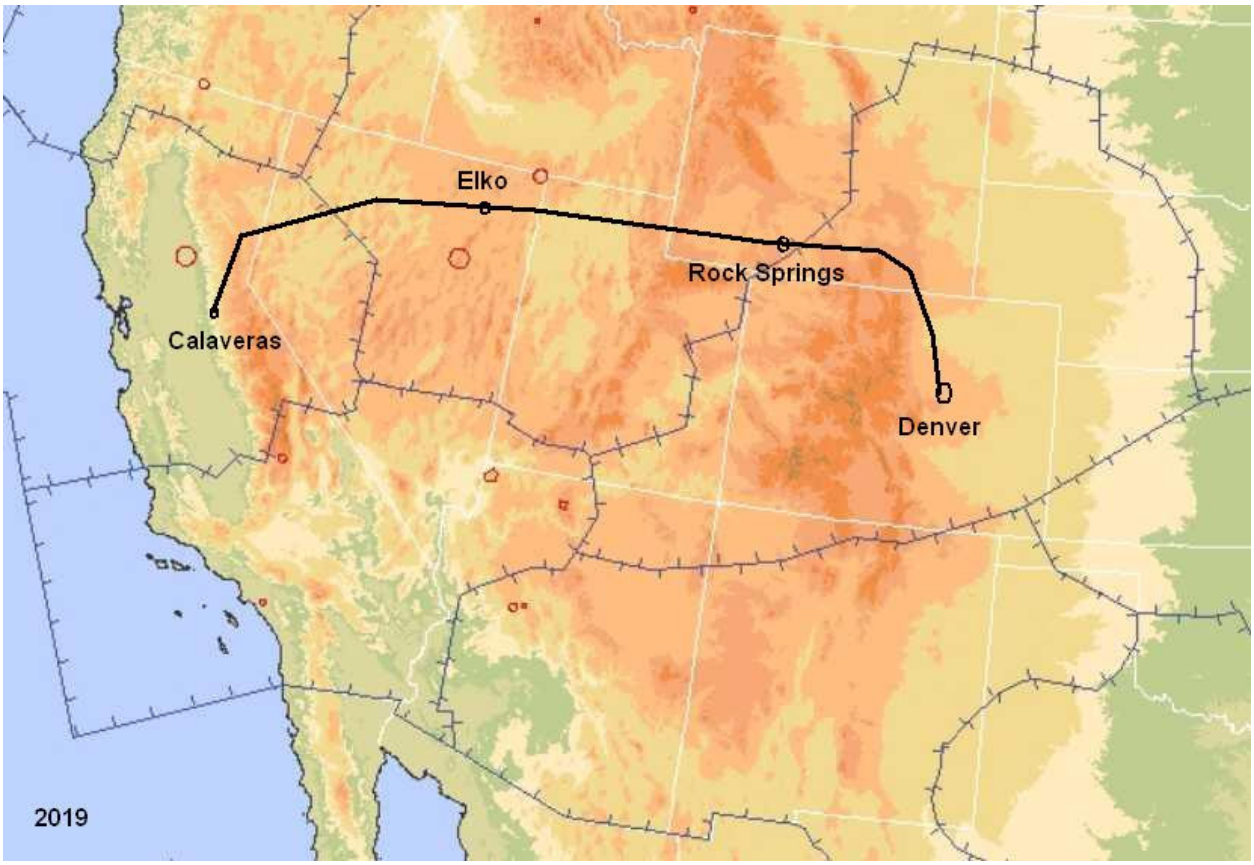
Pulsar Flight across the Mountains



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"Can you come over here for two weeks and fly our airplane?"
Which pilot would say no to such a question, especially if going "over there" involved a long cross-country flight in my Pulsar? This time at least I could avoid the airline trip.
Bye Aerospace, who was asking the question, is located in Denver, Colorado. Their airplane was the proof-of concept eFlyer, a composite two-seater powered by an electric motor.
The weather at the end of July was great, but on the hot side of course. It would be a challenge for pilot and airplane.
I live in California, so I had to cross a lot of high terrain at high density altitudes. I allowed myself two days for the about 850 nm flight, so that I could fly early in the day with mostly smooth air (I hoped).

I started out on a Sunday at 7:00 am with clear sky from the Calaveras airport. and climbed northbound to gain altitude for crossing the first big obstacle, the Sierra Nevada. I selected the Lake Tahoe area, where the highest elevations were below 10,000 ft. I reached my initial altitude target of 10,500 ft just before reaching the mountains bordering the west shore of the lake. There was little wind, so the risk of encountering strong downdrafts was low.

Here I am crossing the ridges east of Lake Tahoe, south of Reno. There were only tiny patches of snow left on the peaks.

Fortunately the fire season was not really going strong yet, so the visibility was good. I soon left the tree-covered western hills behind and the high desert with its brown colors and few irrigated fields greeted me. I transitioned south of the Reno airspace and north of the Minden airport, which is a major attraction for glider pilots because of the great soaring conditions there. This early in the day, the air was silky smooth though. A slight tailwind helped increase my speed, so I made good progress. I had to fly northeast for a while to avoid large restricted areas before I could turn east on a more direct course.

Soon the Nevada desert looked like this:

Very dry, with only a few spots where irrigation allowed some green, round fields to break the monotony.

Farming was soon replaced by mining as a more profitable occupation, as you can see in this example.

Lots of space, and only in a few places humans are leaving traces (like this hole in the ground) that are visible from the sky.

I roughly followed the only highway, which looks like a string with widely spaced pearls, the airports.
Derby on my left, then Battle Mountain, and finally Elko, which I had selected as a fuel stop, after traveling almost 300 nm. Suddenly, during the descent into Elko, something whizzed past

me. I only got a brief look at it but I recognized it from a picture I had seen in the Sport Aviation magazine: it was a tiny Sonex jet. It was going in the opposite direction, obviously on its way home from Oshkosh. This year, I did not have time to visit Oshkosh, so it was a new experience to go against the flow of airplanes coming from there.

I landed in calm conditions, going straight into the long east-west runway at Elko. The airport has an elevation of a little more than 5000 ft, and the temperature was only 24°C yet, so the density altitude was still "relatively" moderate. A lot of lower powered airplanes would be already be struggling, but flying solo in the light Pulsar gave me enough reserves. There were a few other airplanes on the large ramp, next to me a student was pre-flighting a Cessna 172 with his instructor. The FBO was nice and new looking, and I got a quick turnaround. Half an hour later I was back in the still smooth air. Once I was back up at my 11,500 ft cruising altitude, I picked up the 10 kt tailwind that I was already familiar with.

50 miles east, one more highway airport came, Wells, small and deserted looking, before I headed out towards the large salt lake beds and lakes of Utah.

The ground was flat, nearly white from the salt, and the lake visible in this picture had an unreal light azure color. The mountains in the center looked like a dark island in a calm ocean. One very straight long railroad bisected the salt flats, a reminder that once in a while people crossed this fascinating but hostile environment. I much preferred to stay well above it.

The first cumulus started popping up over the peaks, but so far I had no trouble with thermals. That changed once I reached the eastern edge of the wide salt lakes. Brigham City with its nice airport lay at the foot of the first ridges. I passed Ogden to the south before the first mountains reached almost up to my altitude. The thermals were developing and provided me with some lift and extra altitude. By the time I reached Evanston at the Wyoming border, the wind speed had

increased and the turbulence was becoming very uncomfortable. The distance between airports was now much larger and the choice of where to stop for fuel was not much of a choice anymore. I had only one real option with the range of my plane, and that was Rock Springs, in the middle of nowhere. By now I was getting tossed around rather severely; the tolerance for holding altitude had increased to plus-minus 500 ft and I whished I was on the ground.

Rock Springs airport

A lot of other pilots had also selected Rock Springs as their fuel stop, as evidenced by the activity on the radio. At about 7000 ft elevation and 9500 ft density altitude, the airplane's performance was now even more limited. The wind caused some strong downwashes over the ridges and I stayed conservatively high until I was close to the airport. The wind on the ground was also quite strong from the west, but at least the last few feet over the runway were smoother.

When I taxied onto the wide, sun-lit ramp, a guy from the FBO welcomed me and waved me into a parking position. Shortly after I stopped, a few other airplanes, on their way home from Oshkosh, lined up next to the Pulsar. Their pilots and passengers came wearily into the FBO, complaining about the headwind. The FBO is large and modern, with all the conveniences a traveling pilot could wish for. It was now afternoon, and I had no desire to get back into the turbulence that day.

The sun was lower in the sky when an L-39 Albatros jet taxied onto the ramp. Its pilot, a young, thirsty looking man in a flight suit, walked into the FBO and grabbed something to drink. We started talking, and after I found out that he was from Switzerland, we continued the conversation in German.
The jet belonged to the Santa Fe Jet Warbird organization, and he was flying it to Denver. His cruise speed was about 3 x higher than mine, but my fuel flow was much more competitive: 3 gph vs his 200 gph. It turned out that he was also interested in air racing. One of the Red Bull Challenger Class pilots was his friend and he had attended the pylon track race flight training in Reno with this jet with the intention of racing it in September. Unfortunately, he flunked out because of insufficient jet formation flight training. But how is one supposed to get that kind of training, other than in the military? Certainly not in Switzerland.
He was very enthusiastic and envious about the freedom to fly anything just about anywhere in the US. After he left, the flow of traffic slowed down. The sun set, the wind died down to a whisper and the stars appeared, shining brightly in the thin, dry desert air.

I did not get going as early as I had intended the next morning, but 7:30 was still good. With light wind from the east, takeoff was into the sun, straight on course. Remembering the tailwind from the day before, I climbed back to 11,500 ft. Some of the highest terrain was still ahead of me, and even though the straight line distance was only about 230 nm, I could not fly direct. The highest peaks still had some patches of snow remaining from winter, and their flanks were greener from the moisture they continued to capture. The few very small towns and farms I passed looked pretty in the morning sun.
I had to swing way east before crossing a pass and was able to turn south towards Denver. Once I was east of the Rockies, the tailwind deserted me and turned into a headwind.
Now the towns steadily grew in size and more roads and highways criss-crossed the plains. I passed the Fort Collins area with its many lakes and reservoirs and finally neared the Denver class B airspace and the high-rise buildings which marked downtown in the distance. Time to start the descent.

Centennial tower was as busy as ever, but I got cleared to land on runway 17R without delay. Business jets mixed with Cessnas and other small airplanes populated the taxiways as I taxied to

the east part of the airport where Bye Aerospace now had their hangar. It was really nice to be able to taxi right up to the place where I need to go, and get a spot in the hangar for the Pulsar, as opposed to driving a long way to an airline hub, bustling with a lot of other people into an aluminum can with wings, and reverse the procedure at the destination.

My work started soon after my arrival. I first spent some time familiarizing myself with the systems of the eFlyer and their local test pilot John Penney briefed me on procedures. This airplane was their proof-of-concept for evaluating motor, controller and battery performance. It had recently been retrofitted with a new Siemens motor, which we were going to test with different propellers.

Obviously there are some differences in the operation of an electric motor compared to a piston engine. Instead of an ignition switch, there was a "prop enable" switch. The throttle was the only motor control, no mixture, prop control, carburetor heat or choke are needed. To get going, just push the throttle forward. No warm up or run-up is necessary.
An unusual feature was that I could select if, with the throttle fully aft, I wanted the prop to stop, or have it turning quietly at low rpm.

A separate display with data logging was available for motor, controller and battery parameters. Getting used to the low noise level was a pleasure. The propeller still produced some noise, but with the airplane flying overhead at 1000 ft, an observer on the ground could at best hear a quiet humming sound, which usually disappeared in the noise of other traffic on the ground.
Flying the airplane was not really different from the piston engine powered ones I am used to. The fuel gauge is replaced with a SOC gauge (state of charge), which shows how much battery power is left. I kept a close eye on it, because this airplane only had limited capacity which did not allow long flights.

In the two weeks I spent there, I did several flights to collect data, such as airspeed calibration, takeoff, climb, level flight performance and system temperatures. In the afternoon, there usually were thermals, which made it difficult to get good data.
So one day we got everything ready for an early morning flight. For a change, the air was smooth and I was pleased with the test. I had descended from the test altitude and was on short final at the Centennial airport, when suddenly a flock of about 20 geese crossed my flight path, right to left. The birds were slightly above me, and I assumed that I would stay clear of them. At that point I was only about 50 ft above the ground, at 70 kts.

As I saw later on the wing camera video, the geese saw the airplane and began evasive maneuvers. Birds are much better at that than airplanes, so I decided continue on my flight path, especially since I was already so low. Most of the geese made it past me, but then I saw one that was only a few feet higher, right in front of me. I still thought I would clear it, when all of a sudden it was at my altitude and a grey blurry something flashed past me. I heard a heavy thump, and felt the airplane shudder under the impact. I briefly wrestled with the controls to straighten it out, then landed normally.

Two pictures captured from the video show the last moments in the goose's life

The wing camera captured the bird strike perfectly. In slow motion, it showed that the goose in front of me was flying an extremely fast maneuver, a full roll, which dropped it a few feet lower. It was back to level flight just when this picture was captured. If I had been a predator trying to attack the goose, this maneuver would have allowed it to escape. Unfortunately, the tip of the horizontal tail hit its neck.
The airplane was not damaged, and the goose was recovered by the airport crew from the runway, its neck was broken. I felt sorry for the bird, but was disappointed that I could not have it. It would have made a great barbeque.

The rest of my test flights were fortunately less exciting.

West of Denver, flying along the foothills of the Rockies

For my return flight, the morning weather looked good, but I would now have to deal with a lot of headwind. After the Pulsar cleared the Denver airspace, I let it slowly climb northbound to 10,500 ft. So far, my ground speed was still a respectable 113 kts, but I started to feel the effect of the west wind coming over the mountains. I was in the lee and encountered wave activity. I used my glider flying experience and cruise-climbed in the lift to 12,200 ft. The city disappeared behind me and once I was west of Fort Collins, I had to start turning northwest and cross over the mountains. This was some of the highest terrain of the whole trip, and even with my altitude, I had to fly around the higher peaks. First the groundspeed dropped to 85 kts, then even lower, which added up to a headwind of 28 kts. It was getting cold too, so I pulled a jacket over me and turned the cabin heat on. Was this really only August?

Trying to stay warm

The scenery was beautiful, which was a good thing given the fact that I had a lot of time for admiring it. The high valleys were green from recent showers and some snow remained on the rocky peaks.

My goal for the first leg was to reach Rock Springs in Wyoming. Fortunately, after clearing the Front Range of the Rockies, the wind changed more to the south, so once I was over the high Wyoming plains I made better progress. This time, I was the only one on the radio, the Oshkosh crowd had long since moved on. I came straight in to runway 27 and noted the construction work on the taxiway, which was getting repaved. They had left only one taxiway open so that airplanes could get to the ramp. After a short wait for the fuel truck and a quick bite for lunch, I taxied out again. It was getting warm now, I would not be needing a coat anymore. The wind was still on my nose, giving me a groundspeed of 90-95 kts. The thermals, which also got an early start here, were marked by cumulus and provided me with more than enough lift for the climb. For a while, I ended up as high as 13,700 ft, which was plenty of altitude to cross every mountain in my way on this westbound route to Utah.

The last mountains and last cumulus before the Salt Lakes

I had to stay well north of the Salt Lake City airspace and the restricted airspace over the lakes. Once I was past the last ridge before the lakes, the turbulence ceased and the air smoothed out. I slowly retraced the route which I had flown two weeks earlier in the opposite direction.

The colors of this Salt Lake look like an abstract painting

The air was very clear, which is unusual for this time of the year, when normally the smoke from many fires can reduce the visibility to just a few miles. The only fire I saw was on the west shore of the largest lake. It already had a TFR around it, so I kept my distance. Once the flat terrain of the lake beds was replaced by mountains on its western shore, the air became more humid and decidedly bumpy. To the southwest, near Wells, was a large isolated thunderstorm and its rain actually reached the ground. In this dry desert area, it is more common that the rain drops evaporate before hitting the ground.

Ahead of me, high clouds above the larger cumulus indicated that there might be more thunderstorms ahead. I had to make the decision if I wanted to land in Wells, which was in good weather, or press on to my next planned stop in Elko. I could not yet see if Elko was clear and could not receive weather information. I decided to take a chance and pressed on. In the worst case, I would have to fly back 50 nm to Wells. As I got nearer to Elko, I saw that there were showers ahead of me, but the AWOS reported no rain yet. I had to push my speed to near Vne with the throttle near idle to lose the altitude in the lift I still found. By the time I reached the airport, the showers were just on the ridge west of the town, so I had maximized the distance I could fly for the day.

While I tied the Pulsar down for the night, several people came over to take a look at my plane. One of them was a woman who was part of a crew of fire fighters. It turned out that we had met several years earlier in The Dalles, Oregon, where she showed me the Fire Boss, the single engine turboprop float plane she was taking care of. Here they had three of them.
As I found out little by little, this airport was a meeting point for a lot of interesting characters.

Elko, looking east at the good weather

For example, the airplane parked next to me in this picture was being flown by two women, one had blue hair, the other one preferred green.

I waited out the weather in the comfortable FBO, were the rest of the firefighters were hanging out. They were rather bored because there were not enough fires to douse. I thought this was a

good thing, but they were hoping for some lightning strikes from the thunderstorms so that they could go flying. To their disappointment, things just did not want to burn. maybe it was too humid. So instead, they were swapping stories, looked at airplane pictures and watched videos. They all came from different parts of the country. One guy, from nearby Battle Mountain, had a Lancair 4 and an Extra 300. A second one came from Alaska and told us about the benefits of heated hangar floors. Another, the very experienced pilot Lowell Slatter, raced his Formula 1 plane at Reno. In the four years he had competed, he had won twice. His airplane "Fraed Naught", was heavily modified and very sleek with a good wing, so it was no surprise to me that it was faster than the competition.
While we were waiting, we watched a recording of last years race were he placed first. And I learned a lot of details about fire fighting from their insider talk. Touching down on a lake, their turboprops can scoop up about 800 gallons of water in only 15 seconds, and continue quickly to drop it on a fire.

Fire fighters on floats

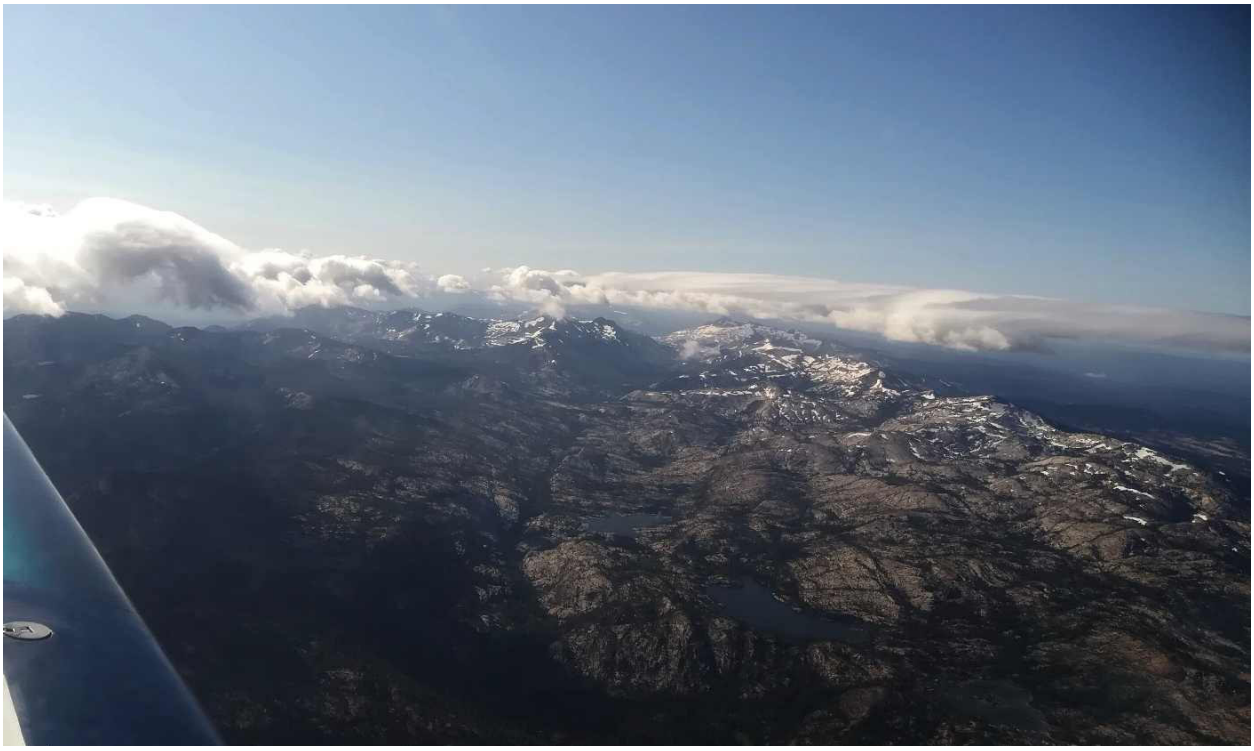
The sky was clear on the next morning, no trace of the rain remained. It was cool and I got an early start. The sun was low in the sky behind me and I stayed relatively low to avoid the headwind higher up. Still, 8,500 ft is not exactly low, until you look at the elevation of the terrain. I had to stick to the valleys, which were fortunately very wide, between the old, eroded hills.

Near Battle Mountain

It was smooth and a beautiful flight. One sees a lot more details at this low altitude over the ground, which kept it interesting. Here and there a dirt road, miles and miles of desert shrub, dried out lake beds, flat like pancakes between the hills, a small, isolated building here and there. If there was water, a small town with a green field or two had sprung up next to the highway.

I had to detour a bit to the north to avoid more restricted airspace until I reached Derby, where I could turn directly towards my destination, Calaveras. This was also the point where the wind, which had gradually increased, reduced my ground speed back into the two-digit range. I stayed on the upwind side of the mountain ranges which were parallel to my flight path to capture some lift because I would soon have to cross the high terrain of the Sierras. I intended to use the same "low spot" as I had on my way east, over Lake Tahoe.

The closer I got to the mountains which border the valley in which Reno and Minden lay, the stronger became the wind from the southwest. I knew I would have to deal with wave effects and potential strong downdrafts, since I was approaching from the lee side. As expected I found some lift just before the first pass, where I gained a few hundred feet, and lost them again in the following sink. There were cumulus clouds over the lake, an indication of turbulence rather than wave, but when I was over the water in the middle of the lake, I found a clear area with strong wave lift, which pushed me up over the base of the lowest clouds. The lift continued until I reached the west shore, and I had to fly above the clouds for a while. The temperature was near freezing, and it was a spectacular sight, the wild, high peaks reaching like teeth into the thin air, ready to comb unwary airplanes out of the sky, above the deep blue surface of the lake. The turbulent cumulus clouds were topped by smooth, veil-like lenticular clouds, past which I was cruising now.



Made it past the west edge of Lake Tahoe

Gradually I left the lake and its clouds behind me. All that was left was a gradual descent towards my destination, into the still strong but smooth wind. The pine-tree covered foothills dropped away at the same rate, so that I maintained the same height above the ground. Even from 50 nm out, I could see the distinctive ridge that stood out just west of the Calaveras airport. It gave me something to aim for. The air was now completely smooth, and way to the west, I could see some low scattered clouds in the bay area.

I heard Cathy on the radio; she was up early, giving rides to some kids in the Cessna. All was quiet when I landed, warm, no wind, a different world from the cold, stormy one I had just left behind over the mountains.