Alex Stocker
In flight with motor and landing wheels

1. Large wing span—60 feet. Good aspect ratio.
2. Engine completely enclosed in fuselage. Propeller blades that can either be set for maximum "exposure" to a helpful tail wind, or can be set at "0" degrees, or entirely enclosed in the fuselage.
3. Landing gear that can be entirely retracted into the fuselage.
4. Trailing edge flaps to increase lift at the take-off and in slope soaring through deflecting the trailing edge. By lifting the trailing edge in straightaway gliding, the maximum speed with the best gliding angle can be attained.

All of the above points have been successfully solved in other phases of air travel. The least developed is the small engine and adjustable propeller. The engine should have at least three, but better, four cylinders. It could weigh more, but good starting is a necessity.

Variable or controllable pitch propellers have progressed farther in the United States than elsewhere.

For some time, I have been experimenting with a power sailplane. In the spring of 1935, I had a sailplane, "Condor I" type, built. I had shipped down to me a two cylinder Kroeber engine of 18 h.p., weighing 60 lbs., with a special mount, for installation above the wing, and secured by 4 bolts. A balance weight of 18 lbs. was fitted into the nose of the Condor. The engine with propeller and mount weighed approximately 110 lbs.

Condor	450 lbs.	Fuel	18 lbs.
Engine, etc.	110 lbs.		
Balance weight	18 lbs.	Total flight weight	803 lbs.
Landing gear	27 lbs.	Wing area	193 sq. ft.
Parachute	15 lbs.	Wing span	57 ft. 1 in.
Pilot	165 lbs.	Engine rating:	18 h.p./3000 r.p.m.

In the first trial, the engine turned up only 2300 r.p.m., because the propeller pitch angle was too sharp. According to brake-horsepower performance curves, this was about 13 h.p. I had only planned to taxi over the field a little, but after rolling 325 ft. and reaching 28 m.p.h., I was astounded to see that I was flying. Slowly, at a rate of 1.6 ft./sec., the Motor-Condor climbed. At 100 ft. altitude, I entered the first thermal chimney. I immediately circled and climbed upward at 3.3 to 5 ft./sec. In no time I had reached 650 ft. with 13 h.p., 803 lbs. weight and poor propeller pitch angle, which was almost 66 lbs./h.p. and 4.12 lbs./sq. ft.

Later, with better engine performance, the take-off run was shortened to 230 ft., and the climbing rate to 3 to 3.3 ft./sec. That performance is sufficient for the demands of any power sailplane. One can always find a 230 ft. take-off strip, and, from a height of 35 ft., turns can be made if there are obstacles ahead.

The sinking speed of the Motor-Condor was 4.25 ft./sec., as compared to 2.63 ft./sec. for the normal Condor I. The primary factor in loss of performance was the aerodynamic turbulence above the wing caused by the engine and mount. The increase in weight was only secondary in importance. Once I soared for 50 minutes to an altitude of 2630 ft., in a strong thermal with the engine shut off.

The whole thing was only an experiment for me with the simplest means. I wanted to prove the good performance attainable with an aircraft of large wing span (57 ft. 1 in.) powered with a weak engine. Still the performance of the Motor-Condor is about the most unfavorable example to give. Improving the ship would greatly aid the sinking speed and better the gliding angle. First, lay the engine in the fuselage, stick the propeller on a small mount of good aerodynamic form—the blades adjustable to meet the soaring demands—and then one comes closer to the ideal power sailplane.

There are many ways in which the power sailplane may evolve. The Motor-Condor, with its overhead installation, is only one of many developments. The entire engine could be retractable, or the engine could be built into the fuselage and the propeller driven through remote drive. The propeller, with mount and remote drive, could be retractable, or the mount could be fixed and the propeller blades varied to suit the conditions as they arise—there are so many possibilities. The twin propeller installation should not be overlooked with remote drive through the wings and retractable propellers.

But, in the end, when one compromises, he resorts to the old adage, "Les extremes se touchent". Why the complications of remote drive with chains that tear; long shafts that cause mechanical fatigue from vibrations? The modern fast airliners, with retractable landing gears, should be taken as an example for the power sailplanes. Only the over-size wing span and the relatively weak engine of 20 h.p. for a two-place ship differentiate the power sailplane from the present-day light plane.

In closing, the reader should consider the possibilities of the power sailplane. The week-end power soaring pilot is in a position to fly whenever he desires, without depending on others. It is not necessary for him to give up flying during the winter as motorless pilots do. With his 20 h.p. engine he can putt around the airport. A pleasant vacation can be spent in a series of cross country flights by using the engine each morning to continue following the wind to an unknown destination. At the close of the vacation, the power of the engine carries him home. And finally, in contests, for example, an event for the greatest distance in 14 days, using a sealed 5 gallon fuel tank for power source.

Every time I see the map of the United States, I visualize a powered soaring flight across the country in 20 stages, always following the prevailing winds. Every morning, 5 minutes of power, then a cross-country soaring flight of 5 to 7 hours. This is only possible in the United States, and I am curious to see who will be the first to accomplish it.