

Sidewinder Program

A brief description of the design/inception and concept.

Design

The Sidewinder was conceived by Jerry Smyth in the mid-1960s while he was in college, as part of his aeronautical degree studies. Contemporaries of the Sidewinder would be plans-built planes like the Tailwind, T-18, Cavalier, and Mustang II. Jerry was a Navy fighter pilot and did much of the design work while on board a carrier during the Viet Nam War. His design goals were a single engine, two place side-by-side tri-cycle gear homebuilt with "fighter-like control response", a smooth, aerodynamic look, and easy handling for low time pilots. It is stressed for limited aerobatics at plus 6 and minus 3 Gs. It has good utility with 150 plus mph cruise speeds with the smaller Lycoming engines. He also wanted the airplane to be easy to build – one goal that he missed on for most builders.

Fuselage

It is fairly complex to build by today's kit standards, as it is strictly plans built, with a limited amount of pre-made parts available. The fuselage is welded up of 4130 A/C grade steel tubing, with aluminum formers and stringers riveted on and a conventional riveted aluminum skin. The fuselage frame took about 6 months to build, using a cut-off wheel and rounded grinding wheel to cut and form the tubing joints. It was all oxyacetylene gas welded. I bought all of the tubing from Aircraft Steel in Erie CO. They were great people to deal with. The landing gear legs were machined from 6150 chrome vanadium steel and associated parts were machined from 4130 steel while I was attending machine shop school at Community College of Denver. The wheels and brakes are 5:00 X 5 Cleveland and the nose wheel is a 4:10 X 4 wheel and tire.

Wings

The wings are all metal with built up spars, formed aluminum ribs, and internal fiberglass wing fuel tanks. The wings are similar in design to the Mustang Two, T-18, or RV-6. The airfoil is NACA 64-212 laminar flow. There are 11 ribs in each wing, formed over wood blocks, and each rib is different because the wing is tapered. Skins are .025" 2024-T3 alum. A simple jig built of 4 X 4 posts from floor to ceiling held the wings during construction. Lyne became active in this portion of the construction, helping drill and rivet the spar cap strips, and later helping rivet the wing and fuselage skins, or any other time I needed an extra set of hands. My wings are modified with a dropped and extended leading edge, built with hot-wired foam cores covered with fiberglass skins, epoxied and riveted to the existing wing leading edges. Dwight Kistling came up with the idea for the drooped leading edges while building his Sidewinder.

Tail

The tail is a built up aluminum all-flying stabilator with anti-servo/trim tab, similar to (copied from?) the T-18. Parts available for purchase were the main spar webs, control spar webs, cowling, wheel pants, and tail surface fiberglass tips.

Engine and Prop

Engines that are recommended are the Lycoming O-235, O-290, or O-320. The Continental O-300 could also be made to work. The best choice in my opinion is the O-320 for best combination of power, light weight, and economy. I first installed a run out O-290 dry sump engine with a cut down and re-pitched metal prop, hoping to get a hundred hours or so on it before overhauling then engine, but it used so much oil in the first few hours I decided to go ahead and overhaul it right away. A friend knew of a mid-time O-320 that was available at a reasonable price (\$1500). I swapped out the engine, installed a fixed pitch wood prop with a 4" extension.

The prop was a Bill Cassidy designed Pacesetter of 68" dia. And 68" pitch. I was on my way to flying off my restarted test period. The Original cost to build was \$10,000.

Flying the Sidewinder

The Sidewinder flies similar to the T-18 or RV-6, except the ailerons are a little heavier. A stock Sidewinder with the 135 HP O-290 will cruise at 160 mph and top out around 170 – 180 mph. With fully faired landing gear, cross-over exhaust system instead of exhaust pipes poking straight down through the cowl, and the O-320 engine, the plane can be expected to cruise at 180 and top out around 190 mph. Stall speeds are 60 ind. power off and no flaps, since it has none. This is about 5 mph ind. lower than the stock wing with no leading edge cuff. There was no apparent top speed penalty after the cuffs were installed. The airplane is comfortable for single place flying, but quite cramped with two FAA average sized people aboard.

Efficiency

Our Sidewinder carries 22 gallons of 100LL fuel in two wing tanks, and 8 gallons in an aux. fuselage tank under the baggage compartment floor, for a total of 30 gallons. At a cruise speed of 180 mph and a fuel flow of 7 gallons per hour, range is 3.6 hours, and 650 miles with 45 minutes reserve. At higher altitudes, cruising at 2350 rpm and 50 degrees lean of peak, fuel flows can be reduced to 6 gallons per hour at 180 mph, which yields 30 miles per gallon. Kent Paser's book, "Speed With Economy" was referred to numerous times over the years to improve the speed and efficiency of our plane.

Modifications

The first mod. to the plane was the engine and propeller swap. After that was installation of an Ellison throttle body, slide type fuel injector. Next was the wing leading edge cuff installation. Then an updraft cowl was tried and abandoned, due to poor cooling. A single electronic ignition was installed on the right side with the impulse coupled Bendix mag installed on the left. Several other wood props were tried over the years, including a Ted's prop, Dwight Kistling, Aymar-Demuth, Ed Sterba, and, finally, I installed an MT electric constant speed prop, which has worked very well. The single electronic ignition was removed and dual "P-Mags" were installed a couple of years ago. There have been four different instrument panels installed in the Sidewinder, the latest one incorporates a Blue Mountain EFIS Lite G4, Grand Rapids engine monitor, Garmin 296 GPS, and King KY-97A comm radio. The original crossover exhaust system was replaced with a four pipe, equal length system I call the organ pipes, due to the cylinder offsets causing the pipes to extend out of the cowl outlet at different lengths.

Racing

The Sidewinder has been entered in five AirVenture Cup races, (best finish second place in class) one Copperstate Dash (second place in class, 181 kts.), one Rutan and Canard Exhibition (R.A.C.E.), (first place in class), and one Sport Air Racing League race, (first place in class, 176 kts.).