



Sport Aviation

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Modern Throwback

The Junkers A50 Junior

A Flying Family

Hard work pays off for these siblings

Homebuilt Buyer's Guide

What to look for, what to avoid

PITTS WITH A KICK

An optimized S-1SS



A red and white Pitts S-1SS biplane is shown in flight, viewed from a low angle. The aircraft is painted in a vibrant red with white accents on the fuselage and landing gear. The background is a soft-focus landscape of rolling green hills under a clear sky. The title 'THE MULE PITTS' is prominently displayed in large, bold, yellow, stylized letters with black outlines, arching over the top right of the image. Below the title, the subtitle 'Paul Muhle's immaculate award winner' is written in a clean, black, sans-serif font.

THE MULE PITTS

Paul Muhle's
immaculate
award winner

BY BUDD DAVISSON

WHEN SOMEONE IS BUILDING an airplane, it's often for the pure joy of creation. When finished, that airplane leaves the nest to provide shop space and financing for the next project.

So, when Paul Muhle, EAA 240833, who has built and rebuilt many more than a few airplanes, finished Pitts N557PM, it would have been logical to think that it would wind up on Trade-A-Plane.com or Barnstormers.com. However, this time, things were different.

"When I built this Pitts, an S-1SS, I was worried I wouldn't be enough of a pilot to fly it and might sell it out of pure fear," Paul said. "Now, however, as long as I'm still breathing, this airplane isn't going anywhere without me. She's a real keeper."

Those are pretty strong words for a guy who has tasted more than a little celebrity from winning awards as an airplane builder and restorer.

“I was born and raised right here in Columbus, Nebraska,” he said. “My dad was a pilot and soloed when he was 16, and spent years in the Air Force as a mechanic. He was always talking about building an airplane and finally got a Corvair Pietenpol in the air before we lost him. I started flying when I was 18 and just out of school. At the same time, I started working for local construction companies. Then, my brother and I formed our own specialized custom residential construction company. By that time, I had already started working on airplanes.”

Paul’s first airplane was an Aeronca Chief. His friend Dick McGlutchen, who had built a Skybolt, introduced him to open-cockpit flying and aerobatics at the same time.

“Almost as soon as he rolled inverted and held it there, I knew I had to get deeper into it,” Paul said. “I bought a KCAB Citabria and started learning aerobatics from Dick. However, it didn’t take long before I knew I needed more airplane. Unfortunately, in the mid-’80s, there was nothing I could afford. I seriously thought about a Pitts Special but wasn’t sure I was good enough to fly one, and I knew I couldn’t afford to buy a two-place Pitts. However, I also knew I could afford to build something. So, in 1984, I started on an Acro Sport II with an IO-360 engine. I finished it and took it to Oshkosh where, to my complete surprise, it took Reserve Grand Champion Plans Built in ’93 and took Grand Champion the next year.”

Paul had spent most of his life to that point creating things with his hands so working with wood was natural. His next project was a DR-107 One Design, the homebuilt monoplane designed specifically for competition aerobatics and built around one of the more complex wooden wings in aviation.

“I built everything to plans except for changing the canopy by raising it up 2 inches,” he said.

That airplane won Grand Champion Plans Built in 2000.

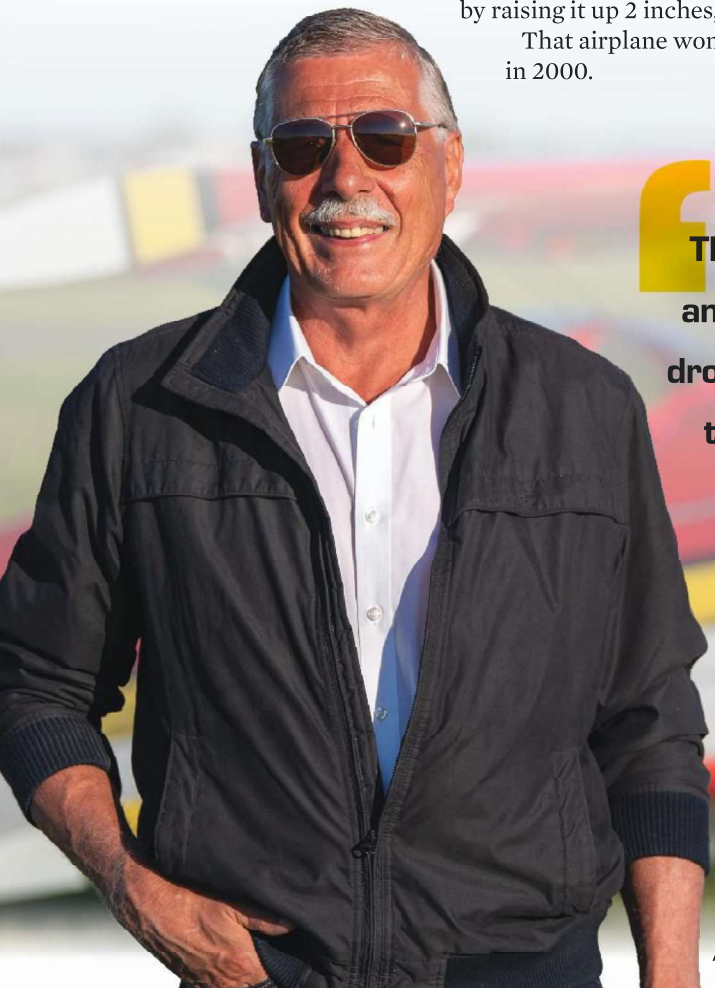
“I like the way One Designs fly and later on ran into a One Design project that had a basic fuselage and a nearly completed wing,” Paul said. “I will finish that one, when I get the time.”

However, Pitts Specials were always in the back of his mind.

“During this whole time, Pitts Specials had been nibbling at my unconscious, and in 2001, I decided it was time I do something about it,” he said. “I bought the plans for the Pitts S-1SS from Steen Aero Lab and cleaned off my worktable.”

In 2006, Paul’s career path took a 90-degree turn. He and his brother shut down their construction business, and Paul followed his instincts and established Muhle Aviation Works, which took off almost immediately. He restores and builds just about everything from Cubs to antiques and has finished three Model 12 Pitts. His work has resulted in multiple awards for Reserve Grand Champions and Champions.

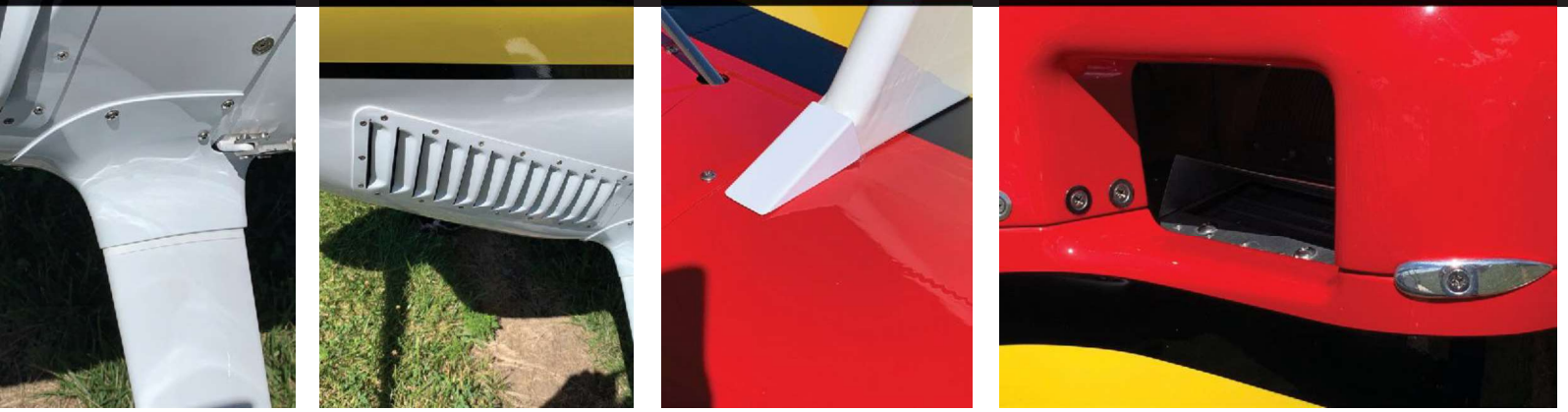
“Now that I’m doing this full time, I don’t get a chance to fly nearly as much as I used to, but my S-1SS is always there waiting and I’m strapped in, whenever I get a break,” Paul said.



“That would be super cool to have my grandkids flying an airplane I built. Especially this one. Every time they drop the hammer on takeoff, in a way they’d be talking to me. That’s how strongly I feel about this airplane.”

— Paul Muhle

A native of Columbus, Nebraska, Paul Muhle has made building award-winning airplanes a habit and a career.



The Mule Pitts is littered with details that show why the airplane won Grand Champion.

The S-1SS Pitts was the last single-place aerobatic biplane Curtis Pitts designed specifically for Steen Aero Lab. He began with the so-familiar, so-respected, and so-beloved S-1S that had introduced a special type of aerodynamics to the biplane community.

Traditional biplanes, meaning those that came out of a factory going back to time immemorial, all had the same basic aerodynamics. The top wing was mounted on the fuselage with a slightly higher angle of incidence than the bottom wing.

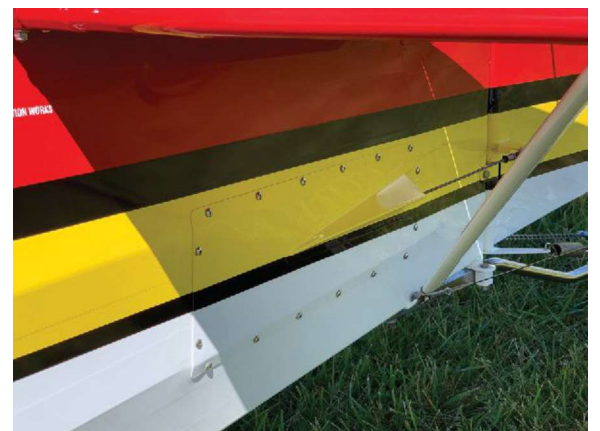
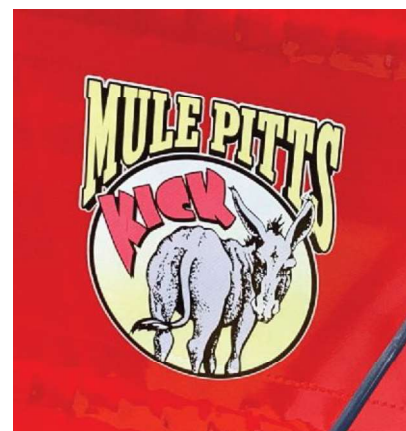
The difference in angles is known as “decalage,” and its purpose is to make sure the top, forward wing always stalls first. The bottom wing continues to fly and, being behind the center of lift, helps push the nose down. It’s a great concept unless you’re upside down — which was the attitude for which Pitts Specials were designed.

Beginning in 1967 or so, Curtis Pitts came up with the concept of making the airfoils symmetrical, with zero camber line, so they could lift equally in both directions. This improved inverted, negative-g maneuvering. Then he eliminated the decalage. The wings were parallel, which greatly reduced the drag.

However, to control the stall, both right side up and upside down, he made the top airfoil slightly different than the bottom wing’s so it always stalled first. This produced the desired stall recovery effect regardless of what position the airplane was in. That’s what the “S” in S-1S signifies. It’s a symmetrical wing single-place (S-1). The original single-place Pitts, the initial S-1C, did not have symmetrical wings but did have decalage. The new concept was truly unique so Pitts was able to patent it.



The canopy is a Muhle original design.



Read what you want into Paul’s logo. The panel under the horizontal stabilizer makes cleaning out the tail area easier.

Steen Aero Lab bought the S-1C rights from Curtis while the S-1S rights went to what is now known as Aviat along with the production S-2 two-place. So, Curtis designed new wings for the S-1C that used an aileron concept he had introduced on the 260-hp S-1-11 Super Stinker. A pure rocket!

The ailerons are symmetrical, meaning a little thicker than the wing, so airflow is always attached. But more importantly, the hinge line is further aft than normal. This reduces the stick forces considerably and eliminates the need for aileron spades. Additionally, the nose of the aileron is a little pointed, so when the aileron is deflected in either direction, the nose progressively reduces the gap which increases the roll rate.

Basically, the effect is like power steering on demand. The more you push, the more you get. The new Steen Aero Lab wings have Super Stinker ailerons, hence the S-1SS. It has the same blistering performance of the S-1S with greatly enhanced roll performance.

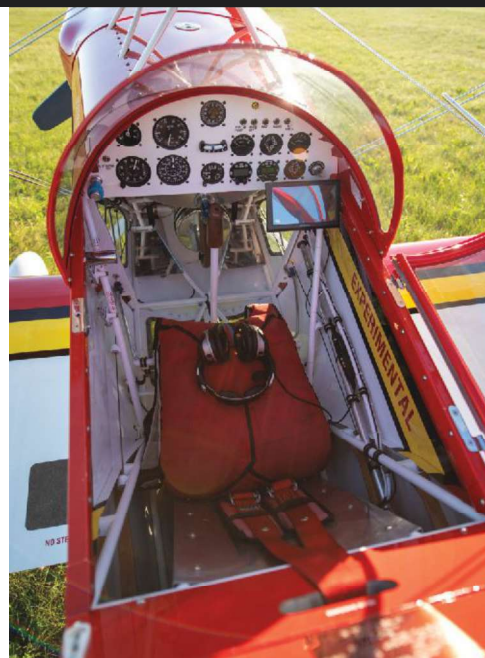
“It was Curtis’ last design, so I wanted an airplane that included all of his latest thinking,” Paul said.

By this time, Paul had flown lots of aerobatics in his Acro Sport II and One Design, so he knew exactly what he wanted in performance, controllability, and comfort.

“Since I was building the airplane from scratch, I could work whatever idea I wanted into the airplane without straying too far from the initial design,” Paul said. “Some of the changes were dictated by center of gravity concerns brought about by what I had ahead of the firewall. I wanted to use a hot rod IO-360 Titan, 9.5-to-1 compression ... driving an MT constant-speed prop. That engine puts out just a little over 200 hp without overspeeding it. That’s one of the reasons for the constant-speed prop. With the fixed-pitch prop you never have exactly the right pitch for every situation. It’s common for Pitts to run Lycomings well over the normal redline when pulling into maneuvers or on downlines. The constant-speed prop eliminates that. It adds weight, but the MT is much lighter than a Hartzell in that application. To accommodate everything, I wound up moving the engine ahead 2 inches for clearance and extending the aft fuselage the same amount for CG. All of this wound up driving the empty weight up to 862 pounds, where most S-1Ss are around 800-820, but it doesn’t hurt the performance at all. I’m seeing 2,200-2,500 fpm climb, and an easy 70 percent cruise of 170-175 mph without running a lot of gasoline through it.”

Paul also worked to reduce the airplane’s drag.

“Rather than using the traditional bungee gear, which requires a lot of extra internal and external structure, as well as producing a lot of drag, I did as Steve Wolf had done,” he said. “I worked a pair of RV tapered-rod gear legs into the motor mount and then built fairings over them to make them cleaner and visually fit better with the airplane. They are lighter, cleaner, and better handling.”



The Mule’s flight deck: Clean, light and functional.



The MT constant speed prop helps keep the rpm down while putting 200 hp into the airstream.





Now, however, as long as I'm still breathing, this airplane isn't going anywhere without me. She's a real keeper.

— Paul Muhle

RV-type tapered rod gear legs plug into the motor mount and contribute to the 170mph-plus cruise speed.

Internally, the wings are pretty much the way Curtis designed, minus a few exceptions.

"I squared off the tips and extended the ailerons so I have even more roll rate," Paul said. "Also, the leading edges are wood, rather than aluminum, which has become a standard Pitts mod.

"The canopy is mostly one of my designs," he added. "It's not radically different than others, but maybe a little cleaner and certainly easier to use. I also squared off the elevators and gave the rudder an outline similar to the One Design to make it look a little bit longer."

Paul flew the airplane for the first time and said he was in love with it "as soon as it left the ground."

"On that first flight, the only glitch was that my oil temperature was high and didn't look as if it was going to come down as the engine broke in," he said. "So, I put another oil cooler in. I cut one down so it would fit in front of the left cylinders, as is done in the two-place Pitts, and the temps came to normal levels."

Overall, Paul said he cares more about the feel of the airplane than winning competitions.

"I'm not a competition acro guy," he said. "Yes, I like an airplane that will do all the maneuvers with ease, and I enjoy doing them, but that's not what I like about the airplane. I just love the way it feels. It is so smooth and everything comes together so well, and I know this is a cliché, but you feel as if it's part of you. Or vice versa. In truth, I can't actually describe it. And this is one of the reasons I'll never sell it. That's something that's going to have to be done after I'm gone. Unless, of course, one of my daughters or one of my grandsons want to fly it. That would be super cool to have my grandkids flying an airplane I built. Especially this one. Every

time they drop the hammer on takeoff, in a way they'd be talking to me. That's how strongly I feel about this airplane."

So, for any readers out there who love the incredible detail, the fact it won Grand Champion Plans Built at EAA AirVenture Oshkosh 2007, the way it flies and its looks, don't bother reaching for your checkbook. It's not available. Oh, wait! Building airplanes and restoring them is what Paul Muhle does for a living. So, maybe there is a way you can have an airplane like this. It just won't be this one. This one's a family heirloom. *EAA*

Budd Davisson, EAA 22483, is an aeronautical engineer, has flown more than 300 different types, and has published four books and more than 4,000 articles. He is also a flight instructor primarily in Pitts/tailwheel aircraft. Visit him on AirBum.com.

