

Lancaster Farming *Antiques Center*

Miniature Merlin Madness

RICHARD YEAGLEY
Machinist

LANCASTER (Lancaster Co.) — In the last two weeks of March 1944, one of every 10 U.S. Army Air Force bombers sent to attack the German cities of Berlin and Nuremberg were shot down. Despite almost a year of incessant attacks by the British flying at night and the Americans sorting by day, German factories had actually managed to increase their production of Messerschmitts and Focke-Wulfs and were producing more fighters each month than the Luftwaffe was losing.

In those two awful weeks, the U.S. air forces in Europe lost a total of 168 aircraft carrying 1,680 highly trained pilots and airmen. Even if this were all-out war against the Nazi Reich, such losses threatened to stagger even the arsenal of democracy.

It is chilling to speculate what might have been, if such losses had continued and the Allies had not established superiority in the air by the time of the D-Day invasion just 10 weeks later. What made the difference in the air war over Europe in those few weeks? In a word — the P-51 Mustang.

Retired Lancaster County machinist Richard Yeagley has had a burning passion for the P-51 since he served in the U.S. Army, in Europe, at the end of the war. Yeagley describes himself as a well-seasoned tool and die maker, who has enjoyed the best of all worlds — being able to both design and build. He is retired from Kensey Nash Corp., Exton, where he designed and built small intravascular surgical instruments. Since childhood, he has been fascinated by anything mechanical, especially aircraft. In retirement he is fulfilling a lifetime dream — he has created a high precision machine shop in his home, and has built a working scale model of the famous aircraft engine, the Rolls-Royce Merlin, which powered the North American Aviation Co. P-51 Mustang to fame and glory during World War II.

Yeagley had long wanted to make a scale working model of an internal combustion engine, and his love for the Mustang led him to select the Merlin as his first subject.

"I didn't know what I was get-

ting myself into," he said, laughing, as he recounts how he started the project in December 1993. Yeagley had learned to fly in 1973, and the age of 48, and had built a Christen Eagle, a light, aerobatic aircraft specially designed to be home-built.

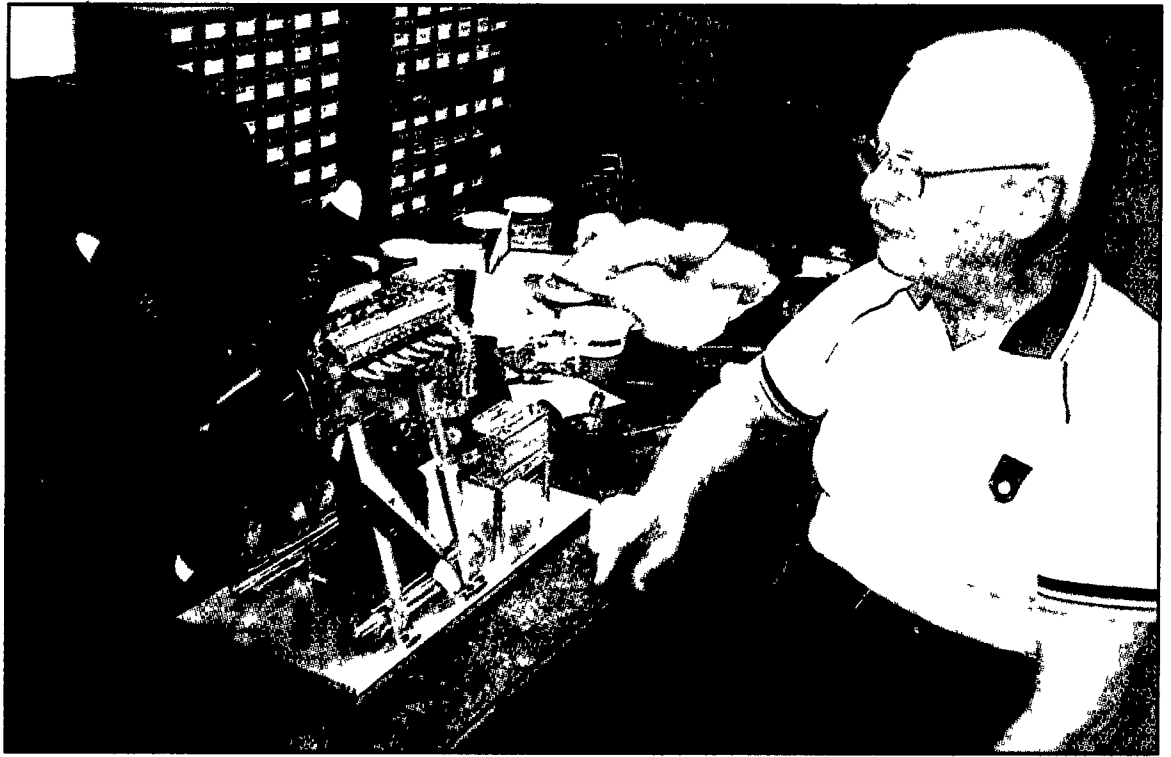
Like most aircraft home-builders, Yeagley had become a member of the Experimental Aircraft Association, in Oshkosh, Wis. His first step was to contact the EAA and request information on the Merlin. The EAA sent him copies of pages from P-51 maintenance manuals used by the U.S. Army Air Corps in World War II and after. Next, he contacted Stallion 51, a company in Kissimmee, Fla. that specializes in restoring, maintaining, repairing and flying P-51 Mustangs.

"Those guys were great," Yeagley recalls. "They sent me a lot of stuff, and let me take a lot of pictures. They even gave me a ride in their TF-51 Mustang, Crazy Horse, which is one of the most beautiful Mustangs that ever existed." A TF-51 is dual/dual-cockpit Mustang that was the final aircraft combat pilots trained in before being deployed to a theatre of operations.

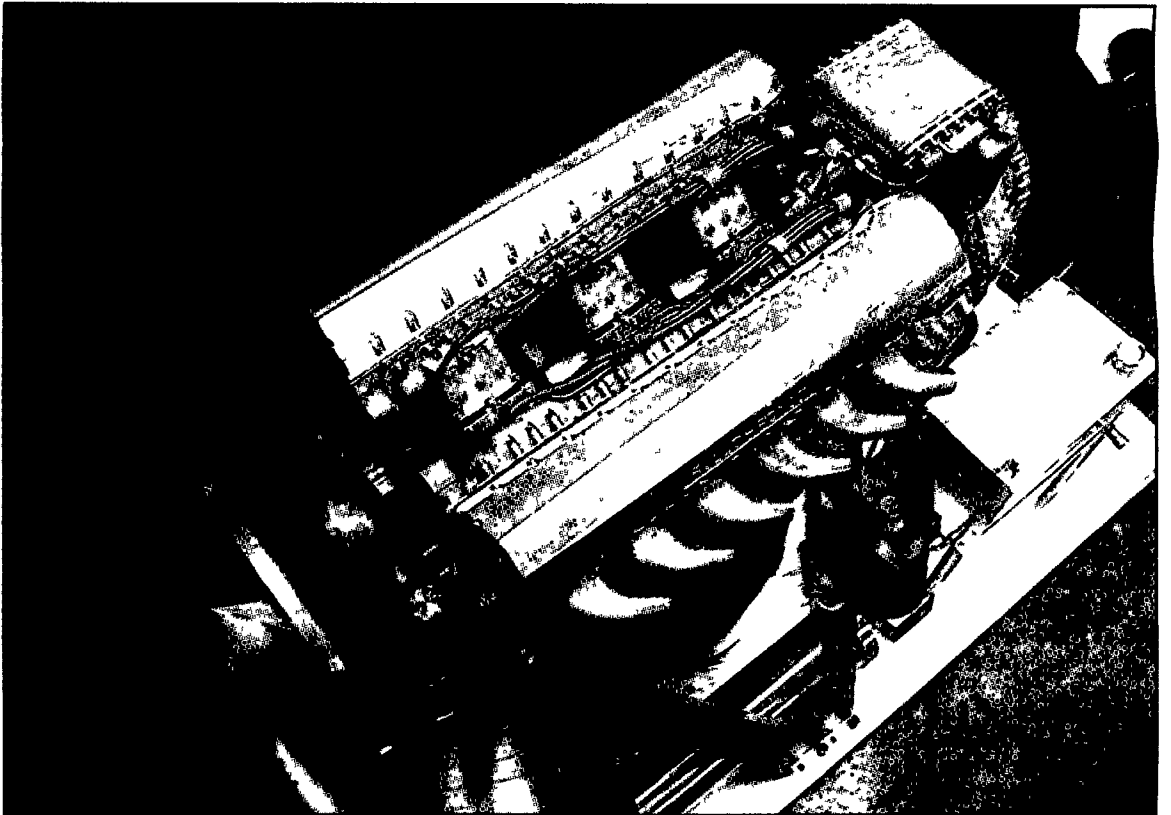
Stallion 51 used Crazy Horse and two other TF-51 to conduct "orientation" rides, to train test pilots for the U.S. Navy Test Pilot School in Patuxent River, Md., and to train commercial airline flight crews in the recognizing and recovering from unusual attitudes and aircraft upsets that if not corrected in a split-second, could lead to a catastrophic loss of control of an airliner. Yeagley was also able to pore over an early Merlin at an automobile museum in Mechanicsburg maintained by the Rolls-Royce Owners Club. He also asked for and received information from the Smithsonian Institute in Washington, D.C.

However, Yeagley never contacted Rolls-Royce to try and obtain actual blueprints for the Merlin. He explains that he had just as much fun designing and drawing each component to make a 1/8 scale model of the Merlin, as he did cutting and fabricating metal to actually make it.

It was the challenge of design that exhilarated him — "It has to make sense on paper before you



Richard Yeagley will be exhibiting his working scale model Merlin engine at the sixth annual Cabin Fever Expo, being held Jan. 26 and 27, in Lebanon, in the Lebanon Valley Exposition Center, 2120 Cornwall Road. It required nine years, thousands of hours to design, make, redesign and remake a miniature 1/8 scale Merlin.



make chips, or all you're going to make in the shop is chips," he notes. He estimates that approximately one-third of the thousands of hours he spent was in front of a drawing board, designing — and redesigning. "Once I got the crankcase made, I realized there was no turning back," Yeagley says.

The bore of a full size Merlin is 5.4 inches; Yeagley's model has a bore of .6875 inch. A full size Merlin had a displacement of 1,658 cubic inches; Yeagley's model displaces only 3.4 cubic inches. The entire model Merlin is about 11 1/2 inches in length. Asked if he has thought about selling the plans, he snorts and declares that he would demand \$150,000 for the plans, and he wouldn't sell the completed model Merlin for \$1 million or more. "I've got the only scale Merlin plans, and the only scale Merlin in the world, and when I die, they'll still be the only ones in the world," he said emphati-

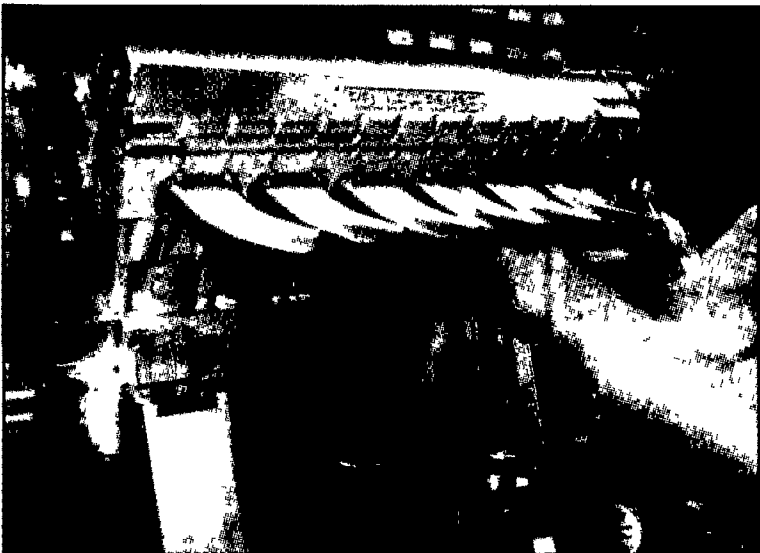
cally. "The Merlin absolutely was essential to winning the war," Yeagley replies to a question. "The Germans had excellent equipment and excellent aircraft, that was really tough to beat. All that changed when the Mustang came on the scene. When a Messerschmitt got on a Mustang's tail, the Mustang just went for the sky. It would just go up, and up, and up. The Messerschmitt would simply run out of up." The Merlin achieved its first missions often lasted as long as nine hours. Like any high-performance engine, the Merlin required a lot of maintenance. Valve lash had to be adjusted after every mission, and every 200 hours, or about once every three to four weeks, the 20 gallons of oil in each engine had to be changed. But, the Merlins rarely failed, and their ability to withstand abuse became legendary.

After the war, development of the Merlin was redirected for use

in civilian transports, with the emphasis on reliability and serve life rather than absolute power.

Over its complete life cycle from the 1930s to 1950s, a total of 168,040 Merlins were built by Rolls-Royce from a relatively small company into a major contender in aviation propulsion. Today, there is a stained glass window at the Rolls-Royce jet-engine factory in Nightingale Road, Derby, England, with the inscription: "This window commemorates the pilots of the Royal Air Force who, in the Battle of Britain, turned the work of our hands into the salvation of our Country."

Occasionally, a worker or manager pauses in front of the window, and thinks about the thousands of Merlin engines produced, "the work of our hands," which helped win World War II and keep the world safe for democracy.



The famous Rolls-Royce Merlin, which powered the American Fighter during WWII, continues to fascinate pilots, engineers, mechanics, and model collectors.