The Car that Won the Air War Over Europe

By

John W. Lawrence

As we near the 60th anniversary of the Allied victory in Europe in World War II, it seems appropriate to revisit this history and tell a story. Unknown to most of us, an American automobile played an important role in the success the U.S. had in the skies over Europe. Here is the story of the automobile that saved the company, that made the engine, that powered the airplane, that won the air war.

The Company

By the mid-1930s the United States, along with much of the rest of the world, was in the depth of the Great Depression. Automobile sales in the U.S. were at an all time low, especially for luxury cars. The long-time independent manufactures of these high-priced automobiles – Stutz, Pierce Arrow, Packard, Dusenberg, and all the others - were against the ropes and were about to be dealt a knockout punch by the rapidly declining market. Packard understood its position well, and knew that it had to do something different to stay in business.

The Automobile

Packard's hope for survival materialized in 1935 when it introduced a medium priced model to compete in a market segment that was still able to sell some cars. It was called the One Twenty (120), so named for its wheelbase. The 120 was an instant success. Soon Packard was producing them at a furious pace, and making money doing it. Nearly 80,000 120s were sold in 1935 and 1936, versus approximately 13,000 senior Super Eights and Twelves for the same period.

What made the 120 attractive to buyers over others in its price field was the close resemblance to the senior Packards. For $1,000 buyers got a 283 cubic inch, 120 horsepower, straight eight engine; independent front suspension; hydraulic brakes; a rich looking interior and instrument panel; and most important, the same general styling features as the senior 8s and 12s. The most prominent features were the stately grill and front-end styling - a much-admired look.

Those who could not afford a senior Packard could still drive a Packard and take pride in their 120s. They could do this at a fraction of the cost of the more expensive senior cars. The 120 was offered in almost every body style of the time including various types of sedans, coupes, and convertibles. Packard proclaimed in their advertising of the 120, "Real Luxury in the Lower Priced Field".

Packard's introduction of the medium-priced 120 was unique to the independent luxury automobile makers. The 120 - and later its six cylinder siblings the 115 and 110 - made it possible for Packard to survive the Depression, and continue as a leading automobile manufacturer for many more years. The other independent luxury

carmakers failed to adapt and went out of business. Lincoln, Cadillac, and Chrysler had the deep pockets of their parent corporations and were able to survive the Depression.

The Engine

Rolls Royce developed an excellent aircraft engine in the 1930s. It was called the Merlin. The Merlin was a supercharged, liquid-cooled, high performance, and complex V-12. It had a single overhead camshaft for each cylinder bank operating four valves per cylinder.

Its development history stretched back to the 1920s. Sir Henry Royce laid-out the design parameters for the Merlin shortly before his death in 1933. He drew upon experiences with the company's Kestrel and the R engines. The Kestrel of 1924 was Rolls Royce's first widely successful aircraft racing engine. It was also the one that gave the company its first experience with superchargers. The R engine replaced the Kestrel. It powered the Schneider Cup winning Supermarine S.6B racer in 1931. Later, an S.6B with a hopped-up R engine, boosted to 2,600 horsepower, was the first aircraft to exceed 400 mph.

With the winds of war blowing in the late 1930s, Great Britain went all out in the production of war goods. Even with increased production, it could not make enough of the Merlin engines. The English-built Merlins were hand-fitted for much of their assembly, as was the British practice at that time. This caused the time to produce an engine to be much longer than one produced using modern precision-engineered mass production practices. The hand-fitted manufacturing practice also precluded easy servicing and the interchange of many parts.

The British Production Commission (BPC) asked the U.S. for help in mass producing the Merlin. The Ford Motor Company was first approached, but declined the offer as they considered the engine to be too complicated for mass production. The BPC then asked Packard to take on the task, and Packard accepted the challenge.

Packard was no stranger to aircraft engine production. In the waning days of World War I, Packard designed and put into production, in a record short time, the famed Liberty V-12 engine.

Packard solved the mass production problems, and in the process made significant engineering improvements. Interchangeability and the other benefits that go with precision manufacturing techniques resulted in an easier to service, more durable, and more reliable engine. Packard had to deal with many constraints in making Merlins for the English. Packard engines had to be able to replace a Rolls Royce made engine without any modifications, and they had to use English Whitworth fasteners throughout.

Packard went all out in building the Merlin. The company constructed a special one million square foot factory at their Detroit site in a record 10 months; hired 1,600 employees; and by war's end produced 55,523 engines for the U.S. and Great Britain.

The Packard-built V-1650 Merlin displaced 1,649 cubic inches (or 27 liters), and produced 1,695 maximum horsepower at 3,000 r.p.m. Each engine cost $25,000

to make. The Packard Merlins were fitted to numerous aircraft including, the British Spitfire and Hurricane fighters, Lancaster bombers, and the U.S. Mustang and Warhawk fighters.

Over its long and varied lifetime the power of the Merlin was increased by more than two-fold, even though the displacement remained at 27 liters. The first production version in 1934 produced 790 horsepower, but by the end of the war these engines were making 1,760 horsepower. This was an increase of almost 1,000 horsepower – more than the total power the original engines produced. They were built in a wide variety of power outputs depending upon the application for low-altitude fighter work, or for high-flying bombers and fighters.

The Airplane

About this same time, the British were also looking for a high performance fighter aircraft to augment their Spitfires and Hurricanes. The Curtis Aircraft Corporation was asked by the Royal Air Force (RAF) to supply their P-40 fighter for English use. The P-40 was the Army Air Corps' primary fighter in the period immediately preceding the U.S. entry into World War II. They are probably best known for their service in China with Chenault's Flying Tigers.

Curtis was up to production capacity on the P-40 and informed the RAF that there would be a one to two year wait. Curtis suggested that the North American Aircraft Corporation might have the capacity to make the needed fighters on license from Curtis.

North American had wanted to produce a new high performance fighter and had done much of the preliminary design and engineering. When approached about producing the P-40, North American said that they had a better airplane in mind and convinced the British to let them build this new one. They brought the airplane into production in a record time of 117 days.

The new airplane was called the NA-73, and later designated the P-51 Mustang. A non-supercharged U.S. Allison liquid-cooled V-12 engine powered these first Mustangs. The U.S. Army Air Corps tried a few Mustangs as A-36 attack aircraft. The A-36 did not work well in this role, as their tender undersides were susceptible to large amounts of damage due to the necessity of having to fly low over exploding targets. The Air Corps quickly abandoned the attack role for the Mustang and began using is as originally intended. Most all of the early production Mustangs went to England. These P-51s were known as the British Is and IAs.

Desperate Times

Now, we move to 1942 when the U.S. Army Air Force (AAF) arrived in England, to begin a bombing campaign, with the RAF, against the Germans. The AAF, flying out of bases in Southeast England and using B-24s and B-17s, would bomb during the day. The English, with their Lancasters and Wellingtons, would fly their raids at night. Initially, the Americans bombed from low altitude, like the British, but this soon proved to be a bad way to go about the job in daylight. The Americans switched to high altitude bombing to decrease the growing and unacceptable casualty rate. This was made

possible by the highly accurate, and top secret, Norden bombsight.

In spite of the change to high altitude bombing, the American bomber casualty rate continued at an unacceptable 20% to 30%. This high rate of loss could not be sustained. The situation got so bad that U.S. temporarily stood down on bombing operations as they tried to find a way to stop the high losses.

The bombers faced two big challenges: heavy anti-aircraft defenses over the targets, and undefended bombers being attacked by German fighters going to and returning from their targets. The bombers were undefended for much of their bombing runs due to the limited range of the escorting fighters. The Germans quickly caught on to the range limitations of the allied fighters, and would have their attack aircraft waiting for the bombers just as soon as the escorts turned back. The U.S. and British were desperate for a fighter aircraft that could escort the bombers to their targets and back.

The Solution

The Mustang was now being used as one of the main escort aircraft by the British and U.S. As good as it was, it needed more speed to better the best German fighters, more altitude to fly above the bombers, and increased range to stay with the bombers to their targets and back.

The British temporarily solved the bomber escort problem with the short use of the Lockheed P-38 Lightning. The P-38, by design, had the fuel capacity for long-range missions. In addition, they were fitted with an updated Allison turbocharged engine that gave them the power and operating ceiling. The British did not like turbocharged engines, and because of this they did not fully exploit the P-38's capabilities.

In 1944 the British decided to experiment, and fit four of their Mustangs with the supercharged Merlin engine. This move proved to be the key solution. Mustangs fitted with the Merlins and auxiliary fuel tanks gave them the speed, altitude and range to fly with and defend their bombers for the entire mission.

The AAF took notice of the success the RAF was having with the modified Mustangs. At this time, however, there was a standing practice that U.S. fighter aircraft would not carry auxiliary fuel tanks. This restriction is as peculiar as the British prejudice against turbocharged engines. The Americans decided to fit their Mustangs with the Merlins and auxiliary fuel tanks. These and other changes resulted in the added capability P-51B (British IIIs) the Allies were looking for – speed, altitude, and range, and made the Mustang the top performer in the Allied air arsenal.

Victory

Once the improved Mustangs were flying, the Luftwaffe's fate was sealed. Soon, the U.S. and British were ruling the skies over Europe. There was no stopping the bombing of factories, airfields, rail yards, sub pens, and anything else to do with the German war machine. The Germans were defeated in May 1945, and World War II in Europe came to an end.

Conclusion

The 120 enjoys a unique position in the automotive world that, for the most part, is not fully understood and appreciated. The next time you see a 120, think about how important it was to the survival of Packard and, in turn, Packard to the war effort.

The Museum's 120

The Blackhawk Museum currently has on exhibit a 1939 Packard 120. This is the cream colored Darrin Victoria Convertible in the upstairs gallery. This is perhaps one of the most attractive 120s ever made. It is unique even as a Darrin Victoria because it is based on a 1939 car with 1941 Super Eight front-end styling.

Sources:
Packard A History of the Motor Car and the Company
Beverly Rae Kimes, Editor
Packard
Dennis Adler
Packard Motor Cars 1935-1942 Photo Archive
Mark A. Patrick, Editor
Illustrated Packard Buyer's Guide
Richard M. Langworth
Milestones of Aviation
National Air and Space Museum of the Smithsonian Institution
Cavanaugh Flight Museum
Addison, Texas
Evergreen Museum of Flight
McMinnville, Oregon

This article is dedicated to all the men and women who contributed so much to the Allied victory in Europe in World War II.

John Lawrence
Walnut Creek, California
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The Packard Built Merlin V-1650

V-12 – Supercharged - Liquid Cooled

Max. Horsepower .. 1,695 @ 3,000 r.p.m.

Displacement …. 1,649 cu. in. (27 liters)

Bore …….. 5.4 in.

Stroke …….. 6.1 in.

Camshafts …… SOHC per bank

Valves …….. 4 per cylinder

Comp. Ratio …….. 6.1:1

Weight …….. 1,690 lbs.

Production …… 55,523

Cost …….. $25,000 ea.

Packard Built Merlins Powered Mustangs, Mosquitos, Warhawks, Lancasters, and Hurricanes