PRATT & WHITNEY

90 YEARS AND COUNTING

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Frederic B. Rentschler
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The Pratt & Whitney Aircraft Company had its start 90 years ago with founder Frederick B. Rentschler's April 1925 train trip from Manhattan Grand Central Station to Hartford, Connecticut, seeking funding and space to build a new class of technologically advanced aircraft engines.

Frederic B. Rentschler was a Princeton educated Air Service captain who had learned the trades of metal molder and machinist while working in his late father's Ohio based company. A specialist in internal combustion engines, young Rentschler had been retained in service through 1919 to wind up production and inspection of the Wright-Martin facilities, which had been building the Hispano-Suiza engine under license. With the war over and Wright-Martin being liquidated, Rentschler was asked to join the company as vice-president and general manager until its liquidation was complete. As its successor postwar aviation company was established, Rentschler would become its president. That new company was to be known as Wright Aeronautical.

With the Wright-Martin plant in New Brunswick, New Jersey having been sold to Mack Truck, Rentschler gathered his Wright-Martin engineering and manufacturing team in a suitable manufacturing plant in Paterson, New Jersey and took over the Wright-Martin licenses to manufacture the two models of the liquid cooled Hispano-Suiza engine. While new designs of Wright's own were being developed to compete in both liquid and radial air-cooled categories, this ready product line in place was to supply the improved versions powering the Jenny and the PT-1.

With the WWI drawdown, Curtiss and Packard remained the only two large engine manufacturers in the aircraft power plant business.

Curtiss was the more successful of the two with its early twenties liquid cooled 400 hp class direct drive Vee-12 engines powering the winning military Schneider Trophy Cup racers. The production D-12, through 1927, achieved a virtual monopoly as the engine of choice for American fighter aircraft. These liquid-cooled engines weighed just over 700 pounds plus the additional weight of vulnerable radiators, pumps, plumbing and liquid required for cooling.

Wright Aeronautical was blessed with its remarkable group of design engineers, planners, and organizers in

George Mead
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place from the Wright-Martin days. A superb engineer and educator named Henry Crane trained all. Among the engineers at Wright-Martin had been George Mead who, before returning to Wright Aeronautical, had accepted with Rentschler's encouragement, a temporary assignment as Chief of the Air Services' power plant laboratory located at its McCook Field research facility near Dayton, Ohio. This provided Mead with the extraordinary opportunity to test and learn the idiosyncrasies of all types of aircraft power plants.

Rentschler selected superb engineer Andrew Van Dean Willgoos as his chief designer, as his production engineer he selected Charles Marks with his knowledge of machine tools, and John Borrup as shop superintendent. Within a year, these men had established Wright Aeronautical solidly in the aircraft power plant business.

As early as 1920 the U. S. Navy, in search of an air-cooled radial engine for use in shipboard aircraft, had engaged Charles Lawrence, the inventor of a small three cylinder air cooled radial engine, to develop a nine cylinder radial engine for Navy use. The Lawrence New York facilities having proven incapable of producing the required engines, the company approached Wright Aeronautical seeking a possible merger. On learning of the Lawrence-Wright discussions, Navy Admiral Moffett invited Rentschler to Washington to assure him of Navy interest in air-cooled radial engines for its first aircraft carrier *Langley*. With demonstrated Navy interest, Wright purchased the Lawrence Company, moved its operation to Paterson, and put his talented engineering team to work redesigning and refining the Lawrence engine. The result of this effort was the Wright J series culminating in the excellent J-5 Whirlwind, later to power Lindbergh's *Spirit of St. Louis* and other record-breaking contributions to aviation.

By early 1924, Wright Aeronautical had established itself as the outstanding aircraft power plant designer/manufacturer, competing well with Curtiss and Packard, which had a higher-powered liquid-cooled engine in development.

Andy Willgoos at work
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The time was ripe for lighter, simpler, and more powerful radial engines in the 400-500 hp class.

By this time, Rentschler was becoming disenchanted with the Wright Aeronautical board of directors whom he felt, in the face of growing competition, were indifferent to fully funding the research and development necessary to sustain Wright's position in the industry. Foreseeing a diminishing future for Wright Aeronautics Rentschler decided to resign.

He first confided in Mead, Willgoos, and Donald Brown who had also moved from Wright-Martin to Wright Aeronautical. Each admitted to similar concerns and offered to resign with him. At his insistence they settled for remaining in their high level jobs with Wright providing that, should Rentschler decide to create another aviation entity, the three would have the opportunity to join him.

The unhealthy state of America's overall aircraft industry in 1924 was lamented in a report by Major General Mason Patrick, Chief of the Army Service. The blame lay in the lack of any appreciable commercial use of aircraft and American industry reliance on meager annual government funding for military purposes. In spite of this gloom, Rentschler, having consulted with his aviation pioneer friend Chance Vought, was convinced of the opening for an all-new air-cooled engine design based on his and his team's accumulated experience in aircraft engine technology. Vought was looking for just such an engine for his planned O2U Corsair.

Rentschler's fund-raising visit to Hartford had been recommended by Rentschler family friend James B. Cullen, New York based president of Niles-Bement-Pond, one of the largest machine tool corporations in the world. Having listened carefully to the younger Rentschler's thoughts on establishing a company to develop and produce the new air-cooled aircraft power plant, Mr. Cullen recognized an opportunity for his Pratt & Whitney tool division which, without its wartime contracts, had idle space, equipment, and money to invest.

Pratt & Whitney had a long history in Hartford, Connecticut, the legendary home of skilled craftsmen with metal working shops dotting the surrounding countryside. Pratt & Whitney actually dated to 1860 when tool company founders Amos Whitney and Francis Pratt set the standard for American made precision machinery and soon the world standard as well. Rentschler had personally known the Pratt & Whitney name since boyhood,

his father's Hamilton, Ohio-Hoover-Owens-Retschler company having prospered using Pratt & Whitney lathes, taps, dies, reamers and other tools.

Pratt & Whitney tool's president Clayton Burt and Rentschler toured the company's vast campus on Capitol Avenue where a more modern four-story building appeared suitable for the planned use. He was surprised to find the building fully stuffed with tobacco, the ubiquitous crop of the Connecticut valley.

With the Navy convinced of the viability of Rentscheler's plans to compete with the liquid-cooled power plants of his competitors, and Niles-Bement-Pond and its Pratt & Whitney tool subsidiary concurring, a ready market for the engine was developing if Rentschler could move quickly.

With agreement reached, funding available and use of the Capitol Avenue building assured, engineers Mead, Willgoos, and Brown quickly joined him and by 1 June 1925, Borrup and Marks had signed up as Rentschler's future shop superintendent and production engineer.

Mead and Willgoos lived down the street from each other in Montclair, New Jersey and did not wait for facilities in Hartford. They selected the detached garage of the Willgoos' home on Wellesley Road as the ideal, quiet, secluded location to set up two drafting tables and begin work on the design for the new engine. With no pre-existing designs, jigs, fixtures or outside distractions to limit their approach, Willgoos and Mead had benefit of a virtual "clean piece of paper," free to work from scratch, joined by third engineer friend Earl Ryder, to design this pivotal new engine.

Design elements unique to the engine came together quickly. It was to be a modern "tri-section" engine with separate nose, power, and accessory sections. The arrangements for the forged crankcase, split crankshaft and solid master rods were in place as were the cylinder design with its rocker-boxes an integral part of the casting and steel barrel and cooling fins machined from the solid. Valves and push rod designs were set as was the rotary induction system in which an impeller would supply a forced oxygen feed, an internal supercharger that was soon to produce impressive performance.

Through June and July, efforts were proceeding in Montclair, as tons of tobacco was being removed bit-by-bit from the selected Poe-Hartford building. Rentschler and Brown were making room for initial offices and the experimental machine shop where the first engines would be built.

On July 14, 1925, a formal contract was signed between Niles-Bement-Pond subsidiary Pratt & Whitney and Rentschler, naming Rentschler president and Mead, vice-president of engineering of the new Pratt & Whitney Aircraft Company. The legal purpose set forth by the lawyers was the "designing, constructing, testing and experimenting with aeroplane engines, aeroplanes, hydroplanes, etc. and if successful, the production thereof."

Half of the ownership in the new aircraft company resided with the tool company, the other half with Rentschler and Mead. It was agreed that responsibility for management would lie with the aircraft company alone. Its board members, including two also serving on the Niles-Bement-Bond board, were in complete agreement with Rentschler that Pratt & Whitney Aviation emphasis would be on continuous advancement of technology.

By August 1, 1925, work had begun in the partially cleared building in Hartford. It was found that most of the tooling needed to build the experimental engines was already available in the Pratt & Whitney tool inventory.

Blueprints for the new Pratt & Whitney engine reached the floor of the Hartford factory in October, materials were in place, and construction of the first engine began.

Pratt & Whitney Aircraft was now firmly established. The former president of Wright Aeronautical and his team of former Wright engineers had escaped the static, old-fashioned company, with its immovable board of directors and obsolete ways and become powerful competitors of their old company. Using their accumulated expertise, these men were taking the first tiny steps toward the giant Pratt & Whitney we know today.

The first Pratt & Whitney engine was assembled and ready for testing by Christmas Eve of 1925. It was decided at this time that the Pratt & Whitney engines would be named after the "Bee" line of insects. Mrs. Rentschler suggested the name "WASP" which was readily adopted.

The Navy qualification tests of the new Wasp engine began on March 4, 1926. The engine met its goals by weighing less than the 650-pound

The Willgoos Montclair garage

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limit and developing between 410 and 420 horsepower.

By the fall of 1926, the experimental Wasp had been substituted for the water-cooled engines for testing on Navy examples of both the Curtiss and Boeing fighters. The results of the Wasps Navy tests saved between 250 and 300 pounds in total airplane weight. The report stated a "faster rate of climb, higher ceiling, shorter turning radius, and lower landing speed while retaining the top speed equal to that of the water cooled in-line engine versions of both aircraft."

Commander E.E. Wilson , Navy chief of Bureau of Aeronautics engine section, wrote in Aviation Magazine: "The Wasp incorporates some of the finest engineering yet seen in aircraft engines, plus workmanship for which Pratt & Whitney is known" He continued: "even in this early point of development the Wasp is considerably advanced over any other air cooled engine class."

While the Navy would pioneer the Wasp with its Boeing F2B-1 and F3B fighters, it would be 1929 before the newly created Army Air Corps would receive its Wasp powered Boeing P-12s.

The Poe-Hartford Building

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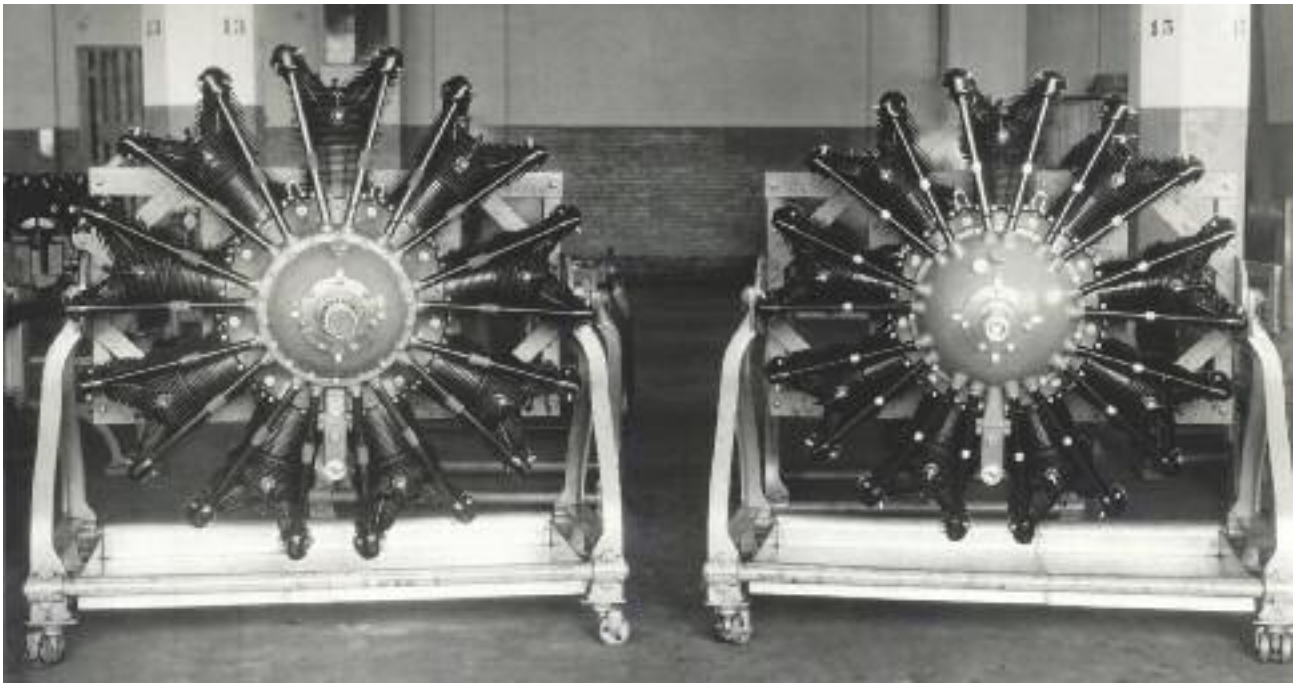
Before the experimental 1340 cubic inch displacement Wasp had been assembled in December 1925, work on the larger more powerful 1690 cubic inch displacement Hornet had begun. The engine was assembled by June of 1926 and, by March 1927; the engine had passed its Navy 50 hour qualification test with a rating of 525 horsepower and a weight of only 750 pounds.

Within two years the new Pratt & Whitney Aircraft company had designed, built, and qualified two of the most advanced and successful power plants of that time. Both engines were to grow in Horsepower, the R-1340 Wasp ultimately to 600 horsepower and the R-1690 Hornet to 850 Horsepower and above.

More on Pratt & Whitney to follow in future issues of Aero Brush.



The Hornet engine on the left and the Wasp engine on the right

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Flight before the Wasp

Keith Ferris, ASAA

The first Pratt & Whitney Wasp was coming together in Hartford as my father, Carlisle Iverson Ferris, entered Army Air Service flight training in September of 1925, the cadet class immediately following that of Charles Lindbergh.

Notoriously unreliable aircraft engines in those days led to flight training emphasizing the fact that the engine was going to fail rather than it might fail.

Dad's first solo on October 13, 1925 followed his simulating three emergency landings away from the home field when instructor Lt. Downing directed him to return to their Brooks Field base. After several landings in front of his fellow students, Lt Downing exited the PT-1 near the stage house telling him to take it around alone. He was to look out for other aircraft and to try not to embarrass himself or his fellow section-mates. Dad was the first in his class to solo.

Students completing the yearlong course had endured the vital "Accuracy Stage," learning to consistently glide to a precise spot on the ground, and the "Hurdles" phase, practicing the avoidance of obstacles encountered once on the ground.

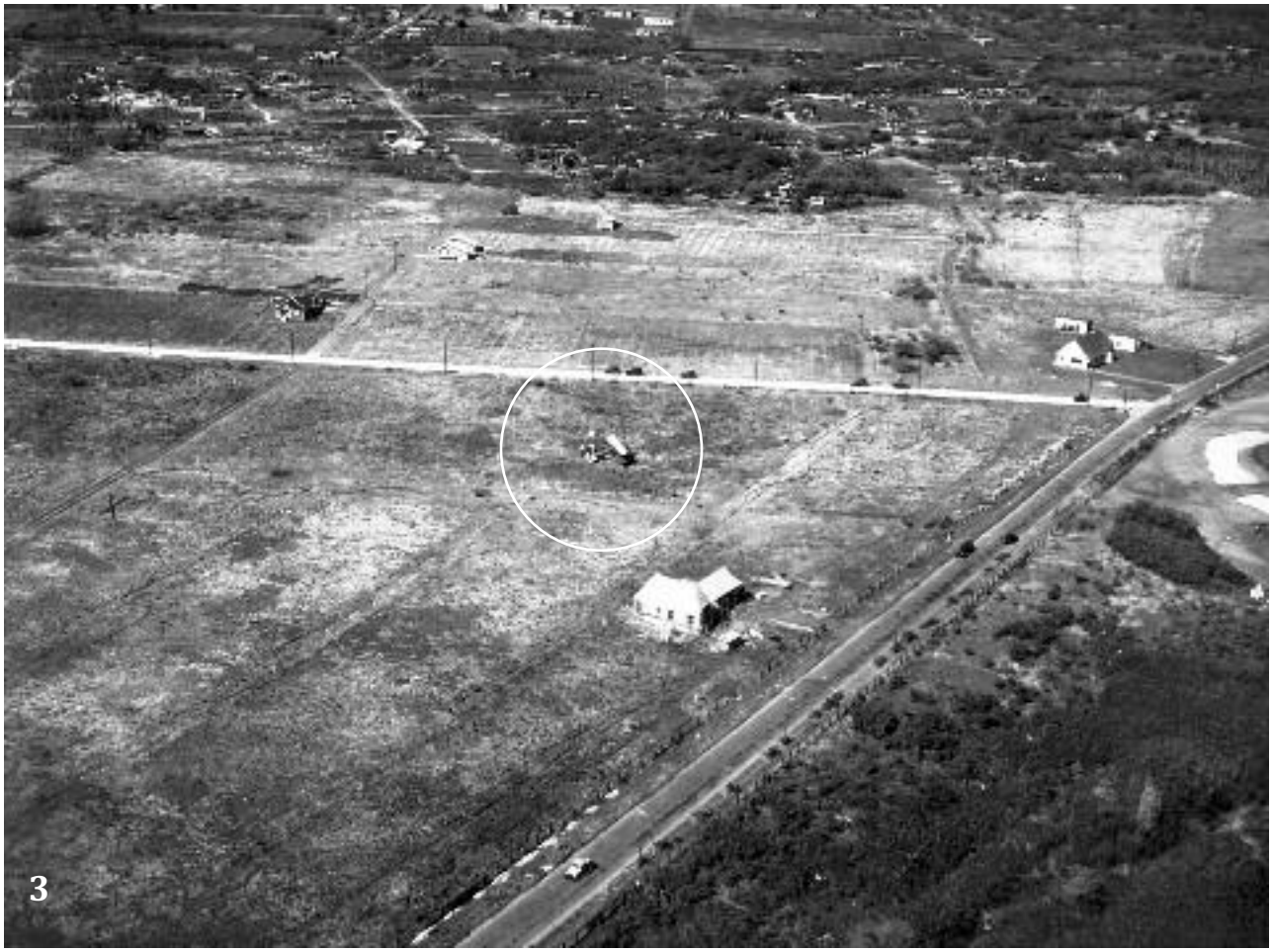
From his DH 4 experience at Kelly in 1926 through the end of his Hawaii service in 1929, the WW I Liberty engine powered every airplane Dad flew.

Typical of his engine related adventures was his November 27, 1928 flight over the sea south of Honolulu's Diamond Head when the Liberty engine of his DH-4 simply quit. At an altitude of 2000 feet, Dad and his observer were high enough to reach the beach avoiding a forced swim among the sharks. Passing over Kahala Beach to the east of Diamond Head, it was apparent that straight ahead he might just reach the safety of Honolulu's Waialae golf course.

On his silent approach, he found the course teaming with people. To avoid the unsuspecting golfers Dad had to maneuver violently, side slipping to land short, hurdling ditches, and coming to rest in the cramped brush covered field. Newspapers reported that golfers thought the maneuvering DH was out of control.

Returning to Texas a year later, Dad was thrilled to find himself destined to fly the Boeing P-12, with its most welcome dependable Pratt & Whitney Wasp engine.

IMAGES
1. The sea off Diamond Head
2. Cadet Carlisle I. Ferris 1925
3. Lt. Ferris DH and Waialae Golf Course
4. DH forced landing Honolulu, Nov. 1928
(Images courtesy of Keith Ferris, ASAA)



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