



THE MERLIN 300

The Merlin/Metro Story (Part 1)

The heady days of ambitions, rewarded by success and growth.
by Mike Potts

During the 1970s and early 1980s, when the business turboprop was in its heyday and accounting for as much as 70 percent of the turbine aircraft market, one of the major players was the Fairchild Merlin.

Designed by legendary business aircraft engineer Ed Swearingen, the Merlin was intended to compete directly with the Beech King Air. In fact, Swearingen believed that his design, which was faster, more fuel efficient and had a comparably-sized cabin, had enough competitive advantage to drive the Beechcraft product from the market and



AN EARLY MERLIN SPORTING A SOMEWHAT DIFFERENT APPEARANCE TO THAT ABOVE



dominate the business turboprop segment.

It didn't turn out that way, however.

Despite its advantages, the Merlin never seriously challenged the King Air in the market. Instead it became one of the "other five" turboprops that shared the approximately 50 percent of the market not held by the King Air during those years. These included, besides the Merlin, the Piper Cheyenne, Mitsubishi MU-2; the Cessna Conquest and the Rockwell Commander series.

The greatest success for the Merlin design came in a somewhat different and unanticipated form as it evolved into the Fairchild Metro. The long-cabin Metro went on to become the industry's best selling 19-passenger regional airliner in the late 1970s and throughout much of the 1980s. It also had a successful career as a business aircraft and a utility and special mission transport for the U.S. military. But all of that was well in the future when, in 1964, Ed Swearingen began putting together the design for what would become the Merlin.

Swearingen already had his own company, Swearingen Aircraft, that for the previous four years had been modifying Beech Twin Bonanzas and Queen Airs. By adding larger engines he created the Excalibur and the Queen Air 800 models. These had sold well enough to make Swearingen Aircraft finan-

cially viable, and provide the basis to expand into aircraft production.

AMBITIOUS CONCEPT

Ed Swearingen's manufacturing concept was ambitious. He originally envisioned a family of airplanes using a single fuselage design that would be available with three engine types – piston, turboprop and jet.

To achieve this goal, he designed the fuselage to be capable of the high sub-sonic speeds a jet would experience, and a great deal of time and effort was spent with the windshield/fuselage interface to optimize performance. The result was a low-drag design that gave the Merlin strong speed and range performance – the hallmarks of its position as a desirable used turboprop in the market today.

Also to accommodate a family of airplanes, the fuselage was designed as a constant radius cylinder that could be mated to different nose and tail configurations. This would also allow the fuselage to be built in virtually any length necessary.

Swearingen chose a round fuselage to achieve a maximum pressure differential, which he believed would significantly improve passenger comfort and reduce fatigue during longer flights. The fuselage was stressed for a 7 psi pressure differential,

which would give the Merlins and Metros a sea-level cabin at 16,000 feet.

With a vision for a new product line in mind, the question for Swearingen became how to transform his concept into an airplane that could be produced and sold in a timely manner? His company was small and not too far advanced beyond the start-up phase. He didn't have a lot of capital. Putting a product on the market would be easier and quicker if he didn't have to design a whole new airplane.

In Swearingen's view, most of the shortcomings of the King Air design lay in what he considered a stodgy design for the fuselage. He was sure a more aerodynamic design, mounted on the same wing, would have significant performance advantages. Accordingly, Swearingen designed his new high-performance fuselage and empennage to fit on a Queen Air or Twin Bonanza wing, which was essentially the same structure as the King Air 90. He then proceeded to buy used Twin Bonanza or Queen Air wings and built his first airplanes using those assemblies.

WHAT'S IN A NAME?

Swearingen chose the name Merlin for his new design, not in honor of the fictional King Arthur's magician, but for the breed of small >

Falcons native to Europe, Asia and North America and known for their speed and aggressive performance.

Swearingen's plan was for the piston-powered airplane, which was to be designated the Merlin I, to come first. A turboprop version, to be called Merlin II, would be introduced soon after. A jet powered Merlin III was to come later.

To obtain peak performance, Swearingen wanted the Merlin I to be powered by a turbocharged, fuel injected, geared version of Lycoming's 540 cubic inch six-cylinder engine, to be designed specifically for the Swearingen application. There were, however, development problems with the engine, and ultimately neither the engine nor the piston-powered Merlin I were ever produced.

Swearingen decided the Pratt & Whitney PT6A-20 would be a satisfactory powerplant for the turboprop version of the Merlin, and so development and certification of this design proceeded on schedule. The first production airplane, designated a Merlin IIA, made its debut in the market in late 1966.

And then, in early 1967, in what would become a pivotal decision affecting the configuration of all later Merlins and Metros, Swearingen signed a contract with Garrett AirResearch to become the exclusive sales distributor for all Merlin sales in North America.

Garrett was the manufacturer of the newly introduced TPE-331 series of turboprops. In connection with the distributor agreement, Swearingen soon signed an agreement with Garrett that all future Merlins would be powered by TPE-331s.

It took a little while for Swearingen to develop the installation of the Garrett turboprop on the Merlin and get it certified, but by mid-1968 this had been accomplished. Sales of the Merlin IIA were discontinued, with a total of 35 aircraft having been delivered, and deliveries of the TPE-331-1 powered Merlin IIB began.

BIGGER POWER

The Garrett engine delivered 665 shaft horsepower, up from 550 on the Pratt and Whitney engine it replaced, so the Merlin IIB offered an upgrade in both takeoff and climb performance, as well as a 25-knot increase in speed on the Merlin IIA. An extra window was added on each side of the rear fuselage on the IIB, giving it a different appearance from the IIA, and the market responded accordingly, with sales of the Merlin IIB soon almost triple what the IIA had achieved in about the same timeframe. A total of 89 Merlin IIBs were delivered before production gave way to the Merlin III in late 1970.

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ED SWEARINGEN



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EARLY MERLIN II



Fueled by strong sales of the Merlin IIB and Ed Swearingen's desire to develop a family of airplanes, two all-new designs were on the drawing board. In addition, a new wing, new landing gear and a new tail were being developed for the Merlin, so the airplane would finally become a completely original design.

The new wing brought a number of

changes that altered the appearance of the Merlin. To accommodate the new gear, the engine was installed with the inlet on top and the exhaust exiting over the top of the wing. This “upside down” position of the engine compared with the installation on earlier Merlins and most of the other airplanes using the TPE 331 up to that time would become

another trademark of all subsequent Merlins.

The legs of the new Swearingen landing gear were longer than the former Beech-designed gear, and gave the new Merlin III a taller and more-stately appearance on the ramp than previous models. The engine was upgraded to the TPE-331-3, with 840 shaft horsepower. This represented a 26 percent increase in power over the earlier TPE-331-1, and gave the Merlin III a top speed above 300 miles per hour, making it real speedster in its class.

The new wing featured large fuel tanks that held nearly 650 gallons, giving the Merlin a usable range of as much as 2,000 nautical miles – significantly more than its competitors. This large fuel tank would also be standard on all future Merlins and Metros.

The Merlin III fuselage was lengthened slightly, mostly to accommodate the interface with the new wing, although the airplane retained the eight-seat cabin layout of the Merlin II.

BIGGER PLANS...

The two new aircraft projects Swearingen was developing were even more ambitious. The first was a stretched version of the

Merlin, intended for the emerging regional airline market, and also to meet the needs of corporate customers seeking more cabin space. Originally intended to seat 20 passengers and with a target maximum gross take-off weight of 12,500-pounds to meet operating limitations for U.S.-based regional airlines at the time, this airplane would become the Swearingen Metro.

The long-cabin Metro would use the same new wing and new landing gear being developed for the Merlin, as well as the new Garrett TPE 331-3, so it too would have a top speed in the 300 mile-per-hour range. A corporate version of the long-cabin airplane would be called the Merlin IV.

The second new design was the jet Swearingen had originally envisioned when he first developed the Merlin fuselage. It would have a delta wing, be powered by twin Garrett TFE-731 fanjets, and seat seven. Originally the engines were to have been mounted on the aft fuselage, similar to a Lear or Citation, but as design work continued, the engines were reconfigured to be in pods under the wing.

It would also need a new name, since the Merlin III designation originally intended for

the jet was now being used on the new short-body turboprop.

In another decision that would have long-term implications for both the company and its products, Swearingen contracted with Fairchild Hiller Corporation (soon to become Fairchild Industries) to manufacture the new Swearingen wing and help market the Metro to the regional airline market. Fairchild already had experience with the higher end of this market in selling its FH-227 50-passenger turboprop.

Midway through 1970 things seemed to be going great at Swearingen Aircraft. A dedicated design team was working on the jet. The Metro was certified as a regional airliner in June, and the corporate Merlin IV was certified in September. The upgraded Merlin III was certified in July. The first long-cabin Swearingen, a Merlin IV with a 12-seat interior, was delivered to Litton Industries just as the year ended. But despite all this good news, disaster lay just ahead.

➤ Next month, we'll continue our journey with the Merlin/Metro into the present day, through recession, depression and changing times to explore how this historic aircraft has found a new economic life. Stay tuned... ■