

O perator Survey: Fairchild's Merlin III Series

The magic seems to live on the Fairchild Aircraft's Merlin III series executive aircraft: Despite a sometimes rocky climb to maturity, they are said to just get better with time.

By **ROBERT L. PARRISH**

June 1988 Document # 3402, 5 pages

It may not have come onto the corporate aviation scene with quite the flare and fanfare of its contemporary "straight pipe" jet counterparts, but the speedy, long-legged Merlin III series twin turboprops powered by Garrett TPE331s reflect a line of business aircraft that seems to have gained stature with age.

Designed by a maverick practical engineer whose reputation was built on an ability to extract far more performance from production aircraft via modification than the original manufacturer might have envisioned, the Merlin III series of executive aircraft models may be described as a litany of improvements that has yet to stop unfolding. The "maverick," Edward J. Swearingen, ultimately became an OEM himself when, by 1966, he had engineered so many changes into the esteemed Beechcraft Queen Air line that it evolved as a new turboprop machine identified as the Swearingen Merlin IIA.

Over the ensuing six years, Swearingen Aviation Corporation churned enough copies of the Merlin IIA and its successor IIB out of the closely held firm's San Antonio facilities to claim some 30 percent of the growing business turboprop world market. But as larger manufacturers with greater financial resources began to expand their product lines, having just a single aircraft model turned the ability to compete into an increasingly difficult challenge.

Consequently, Swearingen "grew" the Merlin IIB design to a family of three models, introduced in 1970

as the Merlin III, the Merlin IV and the Metro. The Merlin III was advertised as an improved eight- to 10-place version of the IIB with a new tail design, a two-foot longer fuselage, slightly enlarged wing, redesigned landing gear, more powerful engines (840-shp Garrett TPE331-3U-303Gs in place of the 665-shp TPE331-1-151G versions that powered earlier Merlins) and a more sophisticated electrical system. In performance, the Merlin III offered a 26-knot better maximum cruise speed, 160-nm greater IFR range with reserve fuel and nearly a 2,500-pound gross weight increase.

The Metro, with the same wing, engines and landing gear as the Merlin III but a 17-foot longer body and high-density seating for up to 20 passengers, was geared to the commuter airline market, and its executive twin, the Merlin IV, was designed to accommodate corporate requirements for up to 12 passengers. All three subsequently were upgraded in power, the Merlin IIIB being equipped with 900-shp Garrett TPE331-IOU-501G engines.

Reportedly, it was the potential shown by the Merlin series that prompted Fairchild Industries to acquire majority ownership of Swearingen Aviation in 1980, resulting in a change of name to the Swearingen Aircraft Division and re-designation of the products as Fairchild Merlin/ Metro aircraft. But a new emphasis on long-body production for airline and special-missions applications was almost immediately discerned. In mid-1982, the company announced delivery of its 500th

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production unit, indicating that 236 of those were Metro airliner configurations.

Meanwhile, the Merlin III series of short-body executive aircraft has continued through five distinct iterations under two type certificates: the straight III, certificated July 27, 1970; its IIIA successor coming along in 1974; the Merlin IIIB, certificated November 3, 1978; the IIIC replacing that version in 1981, and the Merlin 300, certificated in late 1984.

Along the way, however, Garrett's -10 engine developed serious power degradation problems that impacted heavily on the Merlin's claim to dispatch reliability. As a Garrett engineer explained it: "When the -10 and -11 went into production, both used the same gas generator, so the same combustor system was applied to both. A problem developed in the formation of carbon in the original combustor system, caused by non-optimum temperature conditions. Carbon particles were breaking loose and impinging on downstream nozzle guide vanes and turbine blades, causing erosion and ultimately, loss of performance. In addition to loss of performance, what caused us concern was that hot-section inspections were costing the operator more than we liked.

"We tried to address that with special incentive programs whereby we limited the operator's cost exposure," he continued. "We redesigned the combustor system to eliminate the temperature gradient on combustor walls and optimized the fuel nozzles to get better atomization and complete combustion of the fuel. Those modifications eliminated the problem and brought hot-section costs down and inspection intervals up to 1,500 hours for corporate aircraft."

Modification of all -10 and -11 engines in the field was completed in 1985 at no charge to operators, he added, and no similar power degradation problems have occurred since. Because the changes resulted in a new suffix for the Merlin propulsion units (to TPE331-10U-511) the effort was identified as the "Five Eleven Program."

Through the Model IIIB, the Merlin and its Metro stablemate were identified by the engineering designation, SA-226. To achieve approval for a gross weight increase in excess of 12,500 pounds, however, the Merlin IIIC, Metro II and subsequent models were designed to meet certification requirements of SFAR 41 and ICAO Annex 8 as well as FAR Part 23, and the designation was changed to SA-227. The Merlin IIIC, therefore, was offered in two versions- the IIIC-23 for operations up to 12,500 pounds or the -41, which under more stringent operating standards, permitted a 13,230-pound gross weight.

The winglet-equipped Merlin 300 falls in the same category, but under revised FAR Part 23 requirements

that encompass certification of regional airline aircraft, as SFAR 41 standards no longer will apply after October 1991. Technically, the Model 300 still is in production. Fairchild Aircraft officials noted, however, that units are built only on order.

SURPRISING RESULTS

To determine how well the Merlin III series has fared in business aviation and why those units no longer in production are sought on the used aircraft market, B/CA recently conducted a user survey that encompassed nearly a score of operators flying models ranging from the straight III through the IIIC. It was expected that in some respects, survey results might reflect an "apples and oranges" conglomerate of comments because of the manufacturer's continuing efforts to engineer advancements into the line, even within models of like designation. Surprisingly, however, this user cross-section reflected a high degree of homogeneity in mission requirements, utilization performance assessment and even criticisms of specific aspects of the aircraft.

Those who were reached from a list of more than 50 included four operators of the Merlin III, three of whom had installed upgraded -10 engines, two who fly the IIIA, seven who operate the IIIB and four IIIC operators. Although virtually all cited the long-range capability of the Merlin III series as one of its strongest selling points, the vast majority reported average trip lengths of under 350 nm.

Despite the chronological age of some of the aircraft involved, the spread of years that the members of this group had operated their present units seemed to be comparatively low ranging from under two years to a high of 13 years, with an average of 6.8 years. For a substantial number, though, the present aircraft was but one of a series of Merlins. Some had operated up to four successive units and a few boasted of more than 20 years of Merlin II/III experience.

Utilization of the aircraft by those interviewed ranged from a modest 150 flight hours to nearly 900 annually, with an overall average of 434 hours a year. But in terms of average load factors, those surveyed reported that their companies capitalize on cabin size. All aircraft covered, except two, were configured in standard six- or eight-passenger form, and overall load factors averaged about five per trip.

Fuel burns and airspeeds reported also were remarkably similar. The former ranged from overall trip averages of 500 to 590 pounds per hour, with a group average computed at 550 pounds. As for cruise speeds, most of those queried claimed typical readings of 280 to 295 KTAS at altitudes of FL 180 to 230. Some reported that cruise speeds of up to 309 knots were not unusual in cooler seasons. The only figures

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falling below about a 20-knot spread were those claimed by the operator of the unmodified straight III whose aircraft is used primarily as a photo-mapping bed and by two operators (of a IIIB and IIIC) who reportedly assigned priority to economy of operation.

Hourly operating costs, too, fell into a fairly uniform span. Cost of fuel, crew, maintenance and maintenance reserve ranged from \$312 per flight hour to \$370, with the group average calculated at \$345 per hour. The survey sample also showed that slightly more than half the aircraft are flown with two pilots; however, few of those who operate single-pilot believe that policy reflects any compromise of safety, despite admissions that the Merlin III series are comparatively complex machines.

Almost across the board, features of the aircraft most liked by pilots are its high-speed performance, its range/ payload flexibility, its rugged construction and mechanical dependability. One operator noted that "In 13 years, we've had to delay only three missions, all of which were related to avionics."

On the part of passengers, the aircraft's speed and the cabin's roominess, quietness and comfort, coupled with a wealth of baggage space, were cited as the most appreciated Merlin III features. Several pilots noted that, while noise levels are higher on the flight deck than they care for, quietness in the passenger cabin is a particular strong point. The quality of cabin interior furnishings also was lauded by several.

Least-liked features-while less numerous, or at least expressed less passionately-covered a broader gamut. Operators of the Model III and IIIA, along with one IIIC operator, felt that their aircraft were slightly under-powered. Several whose collective opinions reflected judgment on all models, commented that they thought battery power was inadequate and cautioned against repeated starts without aid of a ground power unit. Some of those interviewed felt that the electrical current required for starting the TPE331 engines justified installation of a small APU. Few, however, appeared willing to sacrifice the 220 pounds or so of useful load that would entail.

There was a feeling that the electrical system could be generally improved. Cockpit noise levels, particularly in earlier models, were criticized by some, and general cockpit comfort was considered by several to be below par, especially with respect to the rudder pedal arrangement.

Several operators claimed that they have encountered difficulty in finding maintenance and repair facilities whose personnel are familiar enough with the Merlin III series to provide the quality of service desired. And some felt that availability and price of parts needed improvement.

From the standpoint of handling characteristics, there was no middle ground. Opinions among survey respondents were about equally divided between those who like the heavy "feel" of the controls and those who consider that characteristic objectionable. Those who claim it to be an advantage contend that it enhances the stability of the aircraft in most phases of flight and tends to encourage maintenance of proficiency. Nearly all agreed, however, that pilots become accustomed to the "truck handling" characteristics common to all models involved and that the heavy feel is more than compensated for by the Merlin's broader virtues of flexibility, ruggedness and reliability.

ATYPICAL FACTORS?

Two anomalies surfaced during this user survey that represented an interesting departure from past B/CA investigations. One was that quite a number of individuals employed as company pilots for these aircraft also hold A&P certificates; yet, the bulk of required inspection and maintenance work appeared to be contracted out, despite the complaints of difficulty in finding certificated repair stations that perform services in the manner desired.

The other unusual aspect was that a larger percentage of operators in this survey would have to be classed as only "somewhat satisfied" with product support than is the norm.

The chief pilot of a North Central-based operation whose company has flown four different corporate Merlins over the past 22 years, who presently is operating a IIIC-41 and whose exhaustive studies have confirmed that no other aircraft can compare with the Merlins for the firm's transportation needs, felt that he could explain the possible reasons for that negative response about product support. "Most of the criticism I hear about product or maintenance support is from people who have taken their airplane to shops where mechanics have not attended the factory schools to learn about the aircraft and its systems," he noted. "But the same thing can be said of any complex business aircraft. Some corporate operators try to save on maintenance costs by going to shops with unqualified personnel, but that reasoning can cost them more, in the long run, than using an approved service center."

He added that he would be happier if there were more short-body Merlins in use, however. "A lot of us believe that Fairchild's marketing thrust has emphasized commuter and special-mission sales for quite some time," this operator said. "We find good availability in terms of parts support where it applies to both short- and long-body product lines. But the factory seems to be reluctant to put effort into things that are unique to the short-body models, and as a result some Merlin

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operators may feel that they are shortchanged."

Fairchild executives denied that any intent exists either on the part of the company or its 29 North American approved service centers to discriminate against Merlin III series operators, in terms of either quality or cost of support. "We have the same customer service facilities and telephone 'hotlines' available [at the factory] to corporate Merlin operators as we do for airline users of the Metro," one official said, "and the same updated information regarding technical support is sent to all Fairchild aircraft operators at least twice a year."

With respect to maintenance costs, this company officer suggested that B/CA contact some of Fairchild's service centers to compare Merlin fees with those of similar turboprop business aircraft. One of those reached was an approved service center for both Fairchild and Beech Aircraft; another was a general repair station that is also an approved center for Fairchild models and their powerplants.

At the former, a maintenance manager concurred that inspection and repair costs do relate to the familiarity that shop crews may have with a product, determined in part just by the volume of work they handle on a given model. But another influencing factor is the comparable complexity of two given aircraft, the amount of labor involved in gaining inspection access and related considerations. As an example, he disclosed, his shop has flat-rate fees for "short form" and "long form" inspections for the King Air 200 and Merlin III series. These fees are for the inspection only and do not include repair labor. The "short form" is flat-rated for the King Air 200 at \$1,280 and for the Merlin at \$2,800, he said, while the "long form" process is \$2,800 and \$4,800, respectively. He added that an "apples to apples" comparison cannot be easily made, however, because FAA-approved maintenance and inspection documents differ for the two aircraft.

The other independent maintenance facility manager revealed that his Merlin flat-rate fee is \$2,600 for required A and B phased 50-hour checks and the same amount for the C and D inspections. In either case, however, the average bill for inspection and repair work runs between \$5,000 and \$7,000, he disclosed.

In day-to-day operations, though, the Merlin III series would appear to be remarkably trouble-free mechanically as well as relatively economical, which may be attributable at least in part to the intensive utilization that its commercial counterpart receives in commuter airline operations—up to 185 hours per month, in some cases. That degree of use is also felt to be the reason that Fairchild aircraft have accumulated a prodigious governmental paper file: Up to B/CA press time, FAA records reflected 25 airworthiness directives, with several amendments, on the SA-226 and SA-227 series (see

accompanying sidebar). And some corporate operators complained that Metro operations result in many service letters and bulletins that are not directly applicable to their usage of the aircraft.

"There is no question that the Metro serves as our testbed for revealing any potential deficiencies," a Fairchild executive acknowledged, "but we believe that situation is beneficial to the corporate operator as well. To be forewarned definitely enhances everyone's safety."

GOOD - AND THEN SOME

A possible payoff for careful monitoring of the commercial versions may be evidenced in the overall satisfaction of Merlin operators contacted. Only one pilot-whose flight department inherited a Merlin III C through its parent's acquisition of another company—expressed strong dissatisfaction with the aircraft's ability to perform to his expected standards (described as those of FAR Part 25 aircraft). Even he acknowledged, though, that for the missions assigned (cumulatively amounting to more than 500 hours annually), "it gets the job done."

Nearly all of those interviewed offered mild criticisms—annoyances such as having to realign the main cabin door "click-clack" latch mechanism, instances of windshield delamination or cabin windows cracking. Still, the majority of those who were asked if they would replace the Merlin with another aircraft, given their present missions, replied firmly in the negative.

One pilot who admitted to being an unabashed fan of the Merlin line had flown a IIB for nine years before his company traded it on a new IIIB in 1979. On the basis of the nine years and 4,800 flight hours of experience in the latter unit, "I have absolutely no critical comments to make and think the purchase of any well-kept Merlin would be a smart investment," said Tony Biskupic, chief pilot for The Stanley Works of New Britain, Connecticut.

"Ours is configured for eight passengers and we frequently have all the seats full, but there is still ample room for comfort, and the pressurization and environmental systems in this airplane are outstanding," he added. "Luggage space is better than you'll find in any other airplane in this weight class, and the speed we get over our 600-nm average stage lengths isn't available in any other turboprop that affords the same size and comfort as the Merlin."

There has never been an operating or mechanical problem of any significance since the Stanley airplane was put into service, Biskupic claimed, but he has meticulous records on even the most minor grievances along with what measures were taken to overcome them. With respect to the door-latching mechanism that

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other operators have found to be a nuisance, he noted, "we clean it regularly with lighter fluid so that no sticky film is left on it, treat it with a Teflon lubricant that helps to keep it clean, and it gives us no problems at all."

Another company pilot, based in the Southeast, disclosed that he tried to dissuade his firm from buying the Merlin IIIB when the operation's missions outgrew the capabilities of its previous executive aircraft. "I had flown King Airs and a Westwind for several years before that and had heard some grim stories about the Merlin," he disclosed. "But when I started flying it, I could only conclude that those stories were unfounded.

"It is an unusually stable airplane in flight and on the ground. I think the nosewheel steering system is wonderful," he continued. "It will hold a ton of baggage [figuratively], and it handles crosswind conditions much better than I had been led to expect."

It was this operator's opinion that the Merlin line has been underrated by the business aviation community and could be partly attributed to Fairchild's marketing approach of the time. "If Fairchild had been as aggressive in its corporate marketing efforts as Beech was, I think you'd see as many Merlins in use as there are King Air 200s," he noted.

Daniel O. Dickinson of General Aviation Services in Wheeling, Illinois, a used-aircraft broker who specializes in turboprop equipment, offered an interesting perspective on Merlins: Commenting on reports from several respondents that they receive queries regularly about selling their aircraft, Dickinson said, "I think many of those queries may be just information-gathering calls from brokers or sales agents. Our experience is that used Merlins are selling at about the same ratio as King Air 200s, in terms of total units in the field."

But the Merlins may yet gain an edge. Dickinson cited "average" prices on today's market at \$150,000 to \$285,000 for the Model III, \$225,000 to \$425,000 for the IIIA, \$350,000 to \$550,000 for the IIIB and \$575,000 to \$680,000 for the IIIC. At those prices, an organization for which a Merlin fits the mission requirements would go far to find as much capability for the money, this survey indicated. **B/CA**