Yesterday's Wings:

The Fokker Trimotors

Three-engine plane resulted from Tony Fokker's quest for aircraft that could stay in air if one engine failed, something the twins of the day (1925) could not do. Ford Motor's entry into aviation spurred the trend

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■■ In the late 1920s and early 1930s, the two leading American transport planes were the Fokker and Ford trimotors. There were others, but these two dominated the field in an equivalent of the present Boeing 707–Douglas DC-8 relationship. While a Dutchman, Anthony H. G. Fokker, originated the trimotor transport configuration that became the industry standard, it was Ford, soon to become his major competitor, who provided the incentive for the development of the famous Fokker trimotor.

As soon as World War I ended, Europe began to develop an air transportation system. The first planes used were converted bombers, but these soon gave way to more efficient designs developed specifically for the short European trunk routes. The United States had nothing comparable. There were no airlines of significance and no transport planes. The domestic aircraft industry was stifled for nearly seven years by the glut of cheap war-surplus planes. While Europe was building sound commercial aviation, America was supporting a boom in barnstorming.

New commercial designs began to appear in the United States in 1924. Henry Ford, the automobile magnate, and his son Edsel became involved in aircraft manufacture through the efforts of inventor William B. Stout. Originally backers of Stout and his all-metal airplanes, the Fords were soon so involved that they bought Stout's company and made it a division of the giant Ford Motor Company.

In order to sell transport planes, the Fords had to sell the public on air travel. With no established commercial examples before it, the public at large knew of flying only in terms of the recent war heroics and the antics of barnstormers. The Fords set out to give a convincing demonstration of the reliability of the new breed of airplanes. The method chosen was "The 1925 Ford Reliability Tour."

This was to be a 1,600-mile tour, starting and finishing at the new Ford airport at Dearborn, Mich. It was open to all comers, who were expected to hold to tight schedules on the inter-city flights that were realistic for their particular planes. The object was not an air race, but a demonstration of the reliability of the airplane as a means of transportation.

When the tour was announced, in the spring of 1925, Tony Fokker was in the country. He had formed an American company, the Atlantic Aircraft Corporation, as an outlet for his Dutch designs. The Fokker name was played down in this operation because in 1923, when it was formed, World War I was still fresh in many memories, and Fokker had been the leading supplier of fighter planes to the Germans. Fokker, a Dutch citizen, moved his plant to Holland after the Armistice and was soon established as one of Europe's leading manufacturers of single-engine transport planes.

Upon hearing of the Ford tour, Fokker decided to enter it. The length of the route, with all the intermediate stops, was quite different from the short European routes that the current Fokker models had been designed for. The newest, designated F-VIIA, was a single-engine, high-wing monoplane with a capacity for eight passengers and a crew of two. One of its more admirable features was great flexibility in the powerplant department—it could use practically any available engine in the 350-500 h.p. range, according to customer requirements—even the 420 h.p. war-surplus American Liberty engine.

With reliability the key point, Fokker did some sharp thinking. The least reliable thing about the whole airplane was the single engine. Any trouble with that and the competitor was out of the tour, or at least behind schedule. Since there was no way to improve the reliability of the contemporary engines themselves, Fokker sought a way to reduce the probability of a forced landing after an engine did fail.

The use of two engines was not the answer; there were plenty of twin-engine airplanes in use, but they couldn't stay up on only one. However, with *three* engines, one out was only a 33% power loss, not 50%—enough of a difference to allow the plane to stay in the air.

It proved an easy matter to convert the existing F-VIIA into a trimotor. Fokker sent some cablegrams to his Dutch factory outlining the basic idea and telling the shops to get to work on an airframe then under construction for KLM, the Royal Dutch Airline. He then took the next fast boat home.

The original 450 h.p. British Bristol *Jupiter* air-cooled radial engine was removed from the nose, and a new 200 h.p. American Wright J-4 *Whirlwind* radial was installed in its place. Two more J-4s were installed in nacelles under each wing at the hard points where the main landing gear struts attached to the wooden cantilever wing. Fokker's original intention was to build the new nacelles right onto the wing, but his engineers convinced him that the big radial engines in line with the wing would result in great aerodynamic loss through the disturbed airflow over the wing.

As was his custom, Fokker test-hopped the new model, now designated F-VII trimotor, himself. Convinced that it would do the job, he ordered it disassembled and shipped to the United States for reassembly in the Atlantic plant at Teterboro, N.J.

Since the war was now further in

SPECIFICATIONS AND PERFORMANCE

	F-VIIA/3M	F-10A
Wingspan	63 ft. 3 in.	79 ft. 2 in.
Length	49 ft. 2 in.	50 ft. 7 in.
Height	12 ft. 5 in.	12 ft. 9 in.
Wing Area	630 sq. ft.	854 sq. ft.
Powerplant	Wright J-5, 220 h.p.	Pratt & Whitney Wasp, 420 h.p.
Empty Weight	5,380 lbs.	7,780 lbs.
Gross Weight	9,000 lbs.	13,100 lbs.
Accommodation	8 passengers 2 crew	12 passengers 2 crew
High Speed	122 m.p.h.	145 m.p.h.
Cruise Speed	100 m.p.h.	123 m.p.h.
Landing Speed	55 m.p.h.	55 m.p.h.
Rate of Climb	700 ft./min.	1,250 ft./min.
Service Ceiling	12,500 ft.	18,000 ft.
Range	560 mi.	765 mi.
Price	—	$67,500

the past and the American public was looking ahead rather than back, there was no hesitation about using the Fokker name in connection with the tour airplane. The ship became a flying Fokker billboard, with the Fokker name all over it. There was no requirement for registration letters or numbers in the States at the time, so the whole area of the plane was available. The white rectangles under the wing, used as background for European registrations, carried the letters FOK under the right wing and KER under the left. The name was large on each side of the fuselage and was painted on the leading edge of the wing above each nacelle for the benefit of observers viewing the plane head-on. Even the KLM insignia under the windows was altered slightly to become a Fokker monogram. Coloring was the standard KLM two-tone blue fuselage and tail with clear-varnished plywood on the wing.

Fokker proved the plane's multi-engine reliability on the flight from Teterboro to Dearborn for the start of the tour. A single-engine F-VIIA accompanying the new trimotor was forced down by engine failure.

The tour itself was a Fokker show all the way. Fokker and his copilot maintained split-second schedules, and the ebullient Tony Fokker put on such a show and did such a job of personal promotion that contemporary writers were soon calling the Ford Reliability Tour the Fokker Publicity Tour.

While the tour was a demonstration and not a competition, and there was no declared winner as such (there was to be in later tours), the Fokker trimotor was clearly the star of the show. At its conclusion, Fokker lent the plane to the Army Air Service for tests and soon received orders from both the Army and the Navy for American-built trimotors for military use. Edsel Ford, who was backing Commander Richard E. Byrd's planned flight to the North Pole, bought the tour winner for Byrd. Renamed "Josephine Ford" for Edsel's daughter, the ship made a round-trip flight from Spitsbergen to the Pole on May 9, 1926. Floyd Bennett was Byrd's pilot. This first Fokker trimotor is now on display in the Ford Museum in Dearborn.

The long-range potential of the new trimotor appealed to other explorers. George Hubert Wilkins ordered one with a longer wing for a polar expedition of his own, based in Alaska. He might have beaten Byrd by several months if a Fokker test pilot had not damaged the ship during a test flight in Alaska. This particular plane, the second Fokker trimotor built, later became the famous "Southern Cross" of transpacific flight fame. After his arctic flight, Byrd ordered another long-wing trimotor for a transatlantic flight. This could have beaten Lindbergh across but for a crew problem. It seems that Byrd's pilot couldn't fly on instruments, and the flight had to wait on VFR weather all the way. Lindbergh didn't have this problem. As it was, Byrd's copilot, Bernt Balchen, was able to save the expedition from sure disaster when the weather did close in.

The airlines were quick to adopt the new trimotor, which was neither the world's first trimotor airplane nor even its first three-engine airliner. It just happened to be the right airplane available at the right time. Single-engine Fokker F-VIIAs were still produced, while the trimotors became F-VII/3M. The first American line to use them was the Philadelphia Rapid Transit Airline, set up as a demonstration between Washington, D.C., and Philadelphia during the few months of the Philadelphia Exposition of 1926. This line used Dutch-built F-VIIA/3Ms that were assembled at Teterboro and delivered as American-built planes.

The Army models, with slightly larger fuselages for cargo, were designated C-2, and the equivalent Navy models were TA-1, later RA-1. One Army C-2 was fitted with a Dutch-built long wing and made the first U.S.-Hawaii flight on June 28-29, 1927, at the same time Byrd's long-wing, civil-registered C-2 was flying to Europe. Later long-wing military models were the C-2A, C-7A, and RA-2.

Since the Dutch models weren't designed for American conditions, a new and larger model, the F-10, was developed at Teterboro. This was essentially the long-wing Army model with an improved fuselage and 420 h.p. Pratt & Whitney Wasp engines. The F-10s first went into service on the Western Air Express route between Los Angeles and San Francisco in 1928. The F-10 was followed by a still larger and improved F-10A, built in a new factory at Wheeling, W. Va., for a total of 63 in the F-10 series. This was big production for the 1928-1932 era.

The Dutch plant also developed improved trimotors according to European requirements. The long-wing F-VII became the F-VIIB/3M. This was followed by the F-IX, F-XII, F-XIV/3M (another single or trimotor design), the F-XVIII, and the F-XX.

Ford and Stout acknowledged the merits of the Fokker trimotor by making a trimotor out of one of the single-engine Stout designs late in 1925. However, they used Fokker's original idea of fairing the nacelles into the wing and got the results that Fokker's

1. First Fokker trimotor completely designed in the United States was the F-10. Because of space limitations at the Teterboro factory, wings for the first few F-10s were built in Holland.
Arthur Price photo

2. Single-engine Dutch Fokker F-VIIA transport with 450 h.p. Bristol Jupiter engine, similar to the one that became the first Fokker trimotor.
Bowers Collection

3. The first Fokker trimotor, with three 200 h.p. Wright J-4 engines, at Dearborn for the start of the 1925 Ford Reliability Tour. Note use of the space normally devoted to European registration letters for the word FOKKER.
Ford Motor Company photo

4. The prototype trimotor, after purchase by Edsel Ford and repainting for the 1926 Byrd Arctic expedition, became a Fokker billboard. BA-1 on the nose stood for Byrd Arctic No. 1.
Fokker photo

5. Last American Fokker trimotor was the F-10A, this one used by the Pacific Air Transport Division of the Boeing Air Transport System, which later became United Air Lines.
The Boeing Company photo

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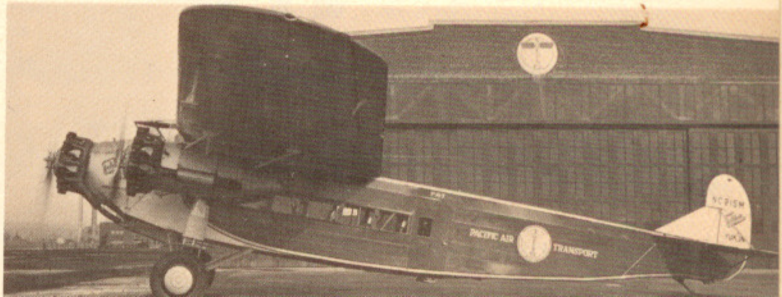


engineers had predicted. Radial engines were eventually wing-mounted, but not until after NACA had smoothed out the airflow with its new cowling, introduced in 1929. The second Ford trimotor had the side engines under the wing and in the long run proved to be a more successful design than the Fokker, thanks mainly to its all-metal construction.

Fokker's American star took a fast dive in the early 1930s. The American plant had always been controlled by "big business," and in 1930 General Motors took over, renaming the Fokker Aircraft Corporation of America, then the parent company of Atlantic, as General Aircraft Manufacturing Company, and combining it with other GM-controlled aircraft plants. Tony Fokker was eased out with a handsome profit.

A fatal crash of an F-10A in March 1931 killed famed football coach Knute Rockne and sealed the doom of the wooden-winged Fokkers in this country. European trimotor sales fell off because Fokker stubbornly stuck to his wooden wings and steel-tube fuselages when the trend was clearly to all-metal construction. He got out of that financial bind, however, by sewing up the European distributorship for the new American Douglas transports.

The Fords and the other trimotors in American service, the Stinsons and Boeings, soon followed the F-10 into airline limbo, not for structural reasons but because the new all-metal, twin-engine types with retractable landing gear (and capable of climbing on one engine), spearheaded by the Boeing 247, made them obsolete overnight in a technological breakthrough that was as big in its day as the introduction of jet transports was to be nearly 25 years later. □

The New Hawk, Shrike Commanders

The *Hawk Commander*, North American Rockwell Corporation's new top-of-the-line general aviation airplane, features a distinctive exterior identification mark—two "eyebrow" windows over the pilot and copilot seats. Manufactured by North American's Aero Commander Division at Bethany, Okla., the 290 m.p.h. twin-engine propjet business aircraft also, according to company officials, boasts a distinctive suggested list price —$369,500, f.a.f., Bethany.

Company officials recently unveiled the new *Hawk* along with Aero Commander's latest model of the *Shrike Commander*, a twin-engine business aircraft which has been approved for aerobatic maneuvers and carries a $103,950 price tag.

"At a manufacturer's suggested list price of $369,500 . . . the *Hawk Commander* with its standard eight-place interior is the best aircraft value in its category," asserted Doyle Bradford, Aero Commander vice president of marketing. The *Hawk* has a ramp weight of 9,450 pounds and a useful load of 3,935 pounds, or 260 pounds more payload than the propjet series formerly offered by Aero Commander.

At a gross weight of 9,400 pounds, under standard atmospheric conditions the *Hawk* reportedly requires a takeoff roll of 1,706 feet and will clear a 50-foot obstacle in 2,016 feet, plus climb at 2,007 f.p.m. It will reach an altitude of 10,000 feet in six minutes and 21,000 feet in 21 minutes, according to company literature. The *Hawk* has a speed of up to 290 m.p.h., and a maximum fuel capacity of 337.5 gallons with auxiliary tanks. Cruising range is up to 1,491 statute miles.

Featuring fully reversible propellers, the *Hawk* reportedly is capable of clearing a 50-foot obstacle and landing within 1,200 feet. The reversible Hamilton Standard 33LF-325 three-blade constant-speed propellers are powered by Garrett AiResearch TPE 331-43-BL propjet engines.

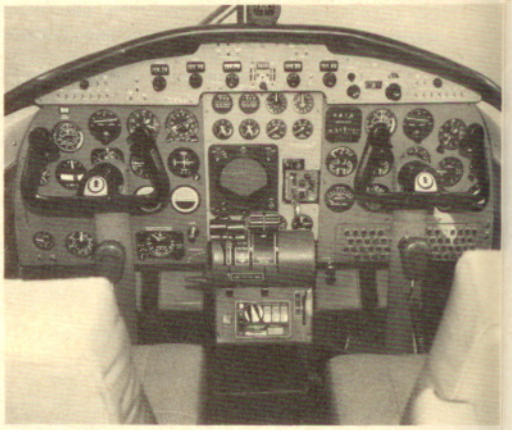
Flight and engine instruments, Beta-control, reversible propellers, automatic propeller synchronization, Foxboro Fuel Flow System and gauges with digital readout, heated fuel vents, electronically controlled exhaust gas temperature readout, engine fire detection system, and an aerodynamically designed radome are listed as part of the *Hawk*'s standard equipment.

Aero Commander's 1969 version of the *Shrike Commander* "is a 'Stag Ship,' an airplane for the businessman-pilot," according to Aero Commander's Bradford. "We believe it's the perfect plane for the hard driving businessman who needs the travel flexibility and speed such an airplane offers but who's not content to just sit back while someone else ferries him around."

Aero Commander's new propjet Hawk Commander can climb 484 f.p.m. on one engine and 2,007 f.p.m. on two. Twin-engine service ceiling with 10° flaps is 25,600 feet. Exterior configuration of the Hawk is similar to that of Aero Commander's 1969 Shrike Commander.
Photo by Aero Commander

The *Shrike*'s bill of particulars indicates it can take off in 1,915 feet and clear a 50-foot obstacle at full gross, 6,750 pounds. It also is credited with being able to land in 2,235 feet after clearing a 50-foot obstacle. An all-metal, high-wing plane, the *Shrike* has a useful load of 2,230 pounds and can carry up to seven persons and their baggage. Separate doors are provided for passengers and the pilot.

Initial rate of climb is 1,340 f.p.m., and top speed is listed at 215 m.p.h. Standard usable fuel capacity is 156 gallons with a maximum range of 1,078 statute miles. Powered by two fuel-injected, direct-drive, Lycoming IO-540-E1B5, air-cooled, reciprocating engines, the *Shrike* boasts wall-to-wall carpeting as part of its standard equipment.



Dual nav/com equipment with two 360-channel transceivers, two 100-channel nav receivers with course indicators, marker beacon/glideslope, DME, and transponder are part of the Hawk's basic IFR avionics system. Numerous optional items also are shown here.
Photo by Aero Commander

Other standard equipment includes flight and engine instruments, control lock, power steering, heavy duty tires, a cabin ventilating system, and a corrosion-resistant zinc-chromated internal structure. The *Shrike* has an empty weight of 4,520 pounds and a cruising speed of 203 m.p.h. at 9,000 feet, 75% cruise power. □