Fokker's Trimotors for the U.S. Services

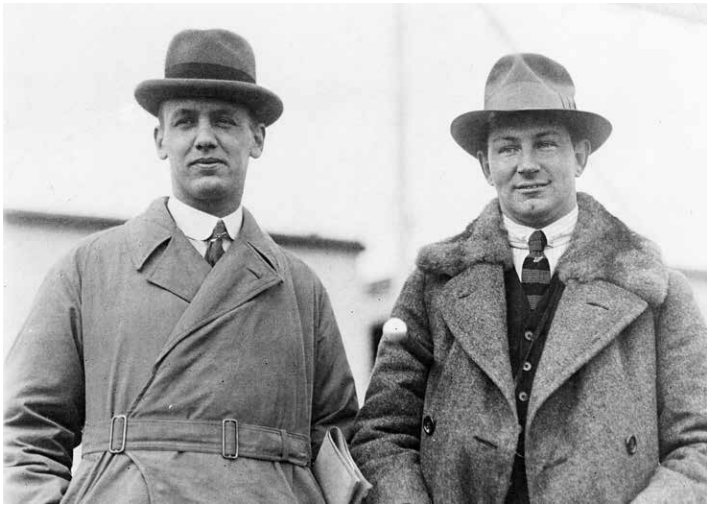
by Gert P.M. Blüm

When Antony H.G. Fokker introduced his first trimotor in the Ford Reliability Tour of 1925, it was a revelation and led to several successive models from his American factory. But its formula proved to have a relative short success in the United States. The developed Trimotor model was mainly used by the U.S. Services, while for the civil market a larger model called F-10/F-10A (Super) Trimotor was produced. Toward the end of 1928, the Fokker Aircraft Corp. of America launched its ultimate trimotor version the production of which ended mid-1930. Yet, the U.S. Army Air Corps was using their trimotors well into the 1930s, when the bulk of the civil F-10/F-10A (Super) Trimotors already had been retired.

Fokker's slow start in the U.S.

Two years after the end of the Great War the reception of Anthony Fokker in the United States was dominated by mixed feelings. His reputation enabled him to obtain some airplane orders for his Netherlands factory from both the Army Air Service and the Navy.[1] It strengthened his belief that a future American Fokker plant was feasible, although differing from Europe. The commercial market still showed no sign of awakening. Soon leaving again for Europe, Fokker left the his secretary, Robert B.C. Noorduyn, in New York to monitor his interests in a branch of the Netherlands Fokker that had been organized. Until the end of 1922, Fokker's boyhood friend Fritz Cremer, based in the Milwaukee, Wis., was also acting as his representative.

Mid-1921 Fokker F.III airliners started to arrive in the U.S. with hangar room rented at Curtiss Field, L.I., N.Y., as temporary base. Even local production was announced, but notwithstanding visits to several idle plants on the east coast, no decision followed to start production without substantial orders. Two of the five imported Fokker F.III airliners remained unsold and possibly were shipped back to Europe. Fokker's intended expansion in the U.S. continued to idle along. This would change when Clement M. Keys, President of the Curtiss Aeroplane & Motor Corp., suggested in letter to Anthony Fokker dated March 18, 1922, that they join forces in the U.S. Fokker expressed interest in a cooperation, and both exchanged letters exploring the potential relationship.[2] In the end however, during his second visit to the U.S., Fokker wrote Keys on June 15, 1922, that he would go his own way.

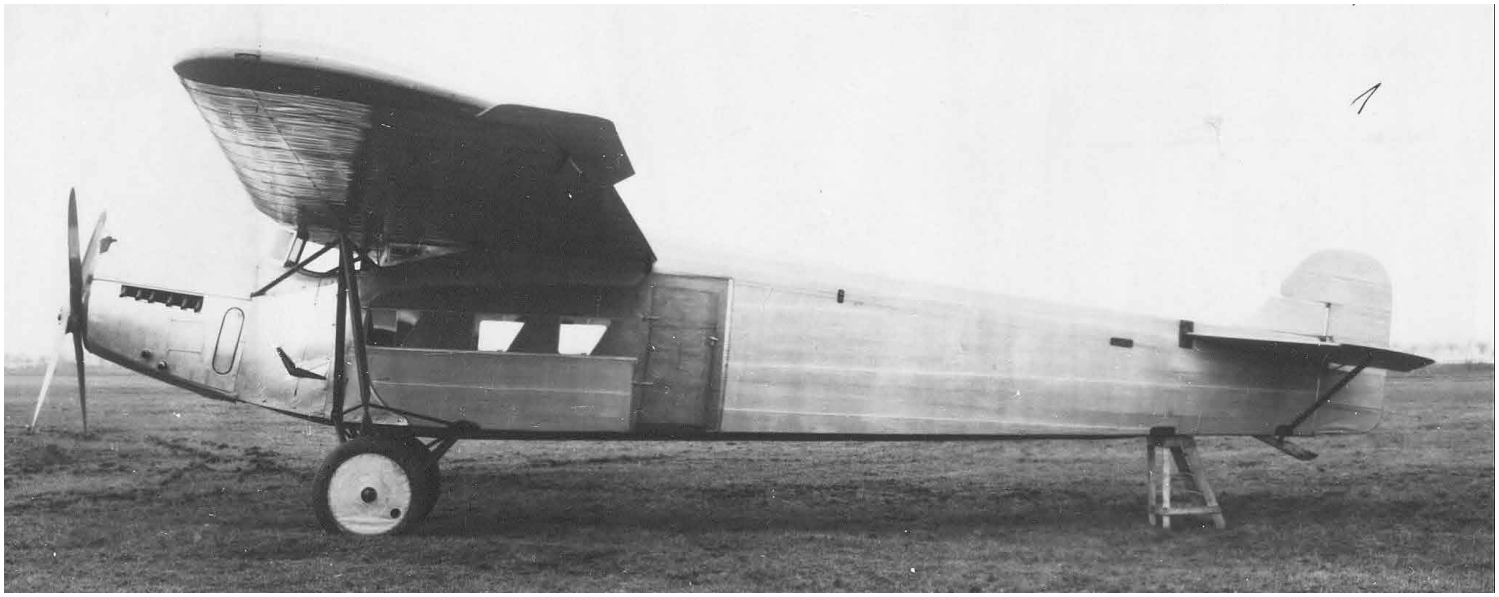


Anthony H.G. Fokker and Robert B.C. Noorduijn (later: Noorduyn) on board of the SS Rotterdam on their way for the first visit to the USA, November 1920. (All photos and drawings from the author's collection)

At the time, on the other side of the Atlantic, Fokker's Netherlands plants were experiencing increased orders for military aircraft, and Fokker even considered focusing on gliders rather than airliners. His designer Reinhold Platz at the Veere plant had started with the development of another airliner, the unconventional F.V biplane/monoplane transport. Noorduyn organized a hasty partnership with Reuben H. Fleet of Gallaudet, to enter it in the Air Service T-3 competition of 1923.[3] The plane's high price prevented an order, which was fortunate as the design proved to be a failure. Winning the competition would have been a Pyrrhic victory for Fokker. On the positive side, the competition brought back Fokker's attention to transport aircraft, and he even started thinking about twin- and trimotored aircraft. While busy fulfilling large military production orders, particularly from the Soviet Union and the secret German Air Force, Fokker took an important step. Early in 1923 he decided to strengthen his design staff with more scientific educated people and assigned Walter Rethel as designer in Amsterdam (and not Platz) to the task of developing a new airliner to be known as the F.VII.[4] This change of the designer's position from craftsman to a more scientific orientated approach would prove successful, although not immediately.

The prelude

Despite the efforts of Noorduyn, a U.S. Fokker plant still seemed far away with marginal new Air Service orders, criticism on quality of deliveries and a lost production order from the U.S. Navy for the FT Torpedo bomber. Meanwhile,



The prototype of the F.VII with its lengthened undercarriage.

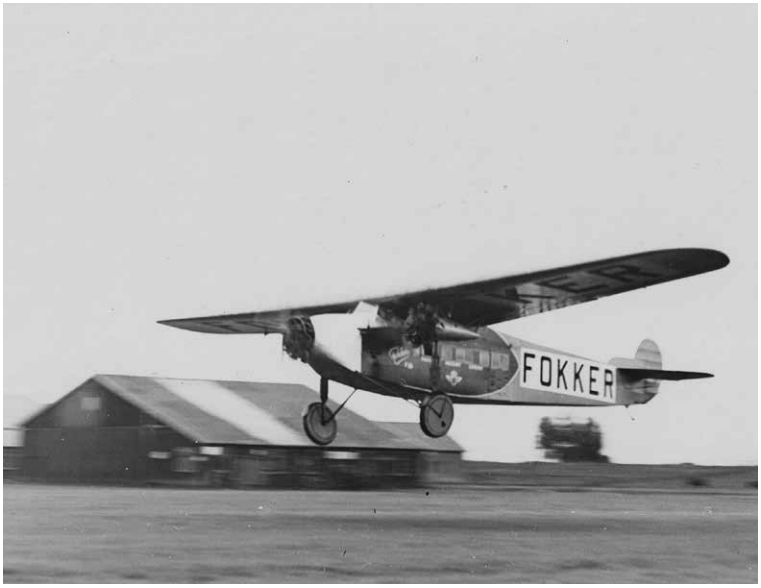
Fokker also had a prominent supporter in the U.S. with Gen. William Mitchell, Assistant Chief of the Air Service. After his visit to the Netherlands Veere factory early in 1922, Mitchell became impressed by Fokker's skills and especially the merits of the steel tube fuselages of his aircraft. In addition, without direct influence from Anthony Fokker, the efforts of Noorduyn as a regular visitor to the Engineering Division at McCook Field began to bear fruit in the latter part of 1923. The prospect of a large order for new steel tube DH-4 fuselages as stimulated by Mitchell,[5] which paved the way for an American plant. Noorduyn managed to receive an option on the lease of the defunct Wittemann Aircraft Corp. factory in Hasbrouck Heights, N.J., through November 1, 1923, and urged Anthony Fokker to come to the U.S. Busy as he was, Fokker had to postpone his third visit to the U.S. in October and the option on the plant was extended until December. Meanwhile Noorduyn had interested U.S. investors willing to join Fokker in the establishment of his U.S. venture, which resulted in the incorporation of the Atlantic Aircraft Corp. on December 14, 1923. Anthony Fokker could not be present in time, arriving four days afterwards in New York, ready to arrange further matters on his U.S. venture. Yet, it took until May 13, 1924, before the DH-4 contract from the Air Service was announced and final steps were taken to secure the future premises.

A new airliner

Anthony Fokker did not wait for a signed contract and returned to the Netherlands in March 1924. He found the new F.VII airliner with Rolls Royce Eagle motor as designed by Rethel back in the shop, having made only a few flights. Originally, when the aircraft transitioned to the horizontal position during takeoff, even a four-blade propeller touched the ground and further flights had to be aborted until the landing gear was lengthened. The aircraft, soon modified, made its first flight on April 11, 1924. A small production run was accomplished for the Dutch airline KLM, which had ordered them in November 1923. It proved to be a promising type that was very stable in the air, correcting itself when stalled. Now, Fokker's investment in the new design staff began to pay off when the three employees with a master's degree in engineering from the Delft University suggested to further improve the new airliner. Jan Rosenschoon, Marius Beeling and Bertus Grasé gave the aircraft a new wing with internal ailerons, a simplified undercarriage and adjustable elevator, among other refinements. Further they choose the Liberty engine as its power plant. Although later to become known as the F.VIIA, the type was originally identified as an 'improved F.VII'. A series of three aircraft were constructed with the prototype's first flight on April 12, 1925. The type proved to be a winner. Even Platz, who at the time had left Veere for Amsterdam was convinced.

The Introduction of the Trimotor

When Anthony Fokker paid his fourth visit to the U.S. in mid-1925, the earlier announcement of "The National Air Tour for the Edsel B. Ford Reliability Trophy" (in short, the Ford Reliability Tour) encouraged him to act on his earlier idea to produce a three-engine airliner. The primary reason was it could offer additional safety in case of an engine failure and so could promote air transport. In the U.S., the Wright factory simultaneously produced a new air-cooled engine of around 200 hp of which one was used on the Universal plane designed and built in the U.S. by Atlantic Aircraft Corporation. Fokker instantly believed the engine was well suited for use in a trimotor airliner. He hastily ordered three Wright J-4 engines to be shipped to the Netherlands and instructed his company to power the improved F.VII with them. A Dutch work force, headed by Reinhold Platz, quickly managed to modify the second 'improved F.VII' into a trimotor, designated F.VII/3m. It was hastly tested at Schiphol Airport near Amsterdam and proved to be an outstanding success. A larger wing for the aircraft was also built but not used.[6] The aircraft was hurriedly



The first F.VII/3m during a test flight over Schiphol Airport. Note the original large tail fin.

shipped to New York and, after being erected at Roosevelt Field, the prototype F.VII/3m flew to Detroit for the start of the Ford Tour on September 26, 1925, displaying its 'Fokker' identification from every angle.

The new aircraft's participation in the Ford Tour brought Fokker a lot of publicity, not the least by his clever way of marketing.[7] After the end of the Tour on October 4, 1925, a sales drive started with demonstrations in several cities. Civilian orders for the imported F.VII/3m soon followed, but at a slow rate. Fokker felt he could use the new type to re-establish his name within the U.S. Services. So Fokker demonstrated his F.VII/3m on both Bolling Field in Washington, D.C., for Government authorities as well as at McCook Field, Dayton, Ohio, to the Engineering Division of the Army Air Services. He even convinced the Chief of the Air Service, General M. Patrick, that his trimotor was not only the solution to the Air Service's need for transports, but also was usable as an ambulance and bomber.[8] He argued there was an efficiency in use and maintenance that could be reached, not to mention of the interchangeability of use dependent to the actual need.

A multi-purpose F.VII?

With a need to obtain follow-up production orders after the DH-4 fuselages were delivered, the Atlantic Aircraft Corp. (AAC) hurriedly produced drawings dated December 7, 1925, of three different versions of the new type (now called Trimotor), all powered with three Wright J-4 Whirlwind engines and identified as:

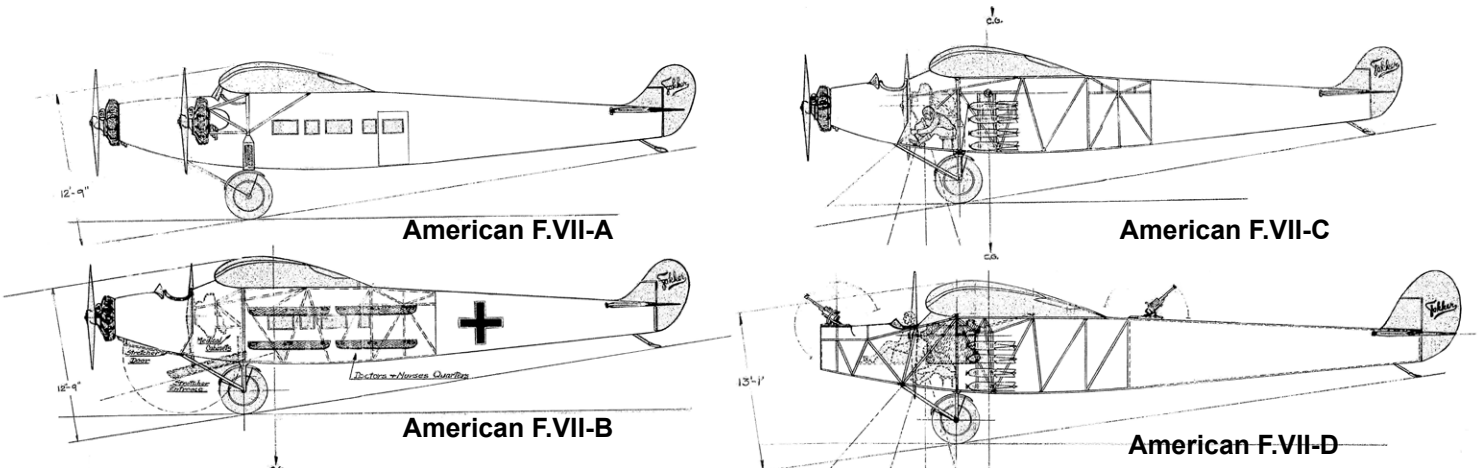
- F.VII-A Trimotor Transport modelled after the participant in the Ford Tour
- F.VII-B Trimotor Ambulance with six litters
- F.VII-C Trimotor Bombardment suitable for a bomb load of 560 lbs.

All these models had identical dimensions. Based on feedback from the Air Service on the position of the cockpit of the F.VII/3m, on both the F.VII-B and –C the nose was changed to an open cockpit with the pilots seated in front of the outboard propeller arcs instead of behind it. A special feature of the ambulance was the litter entry, situated underneath the cockpit by a hatch in the cabin floor, opening to the front.

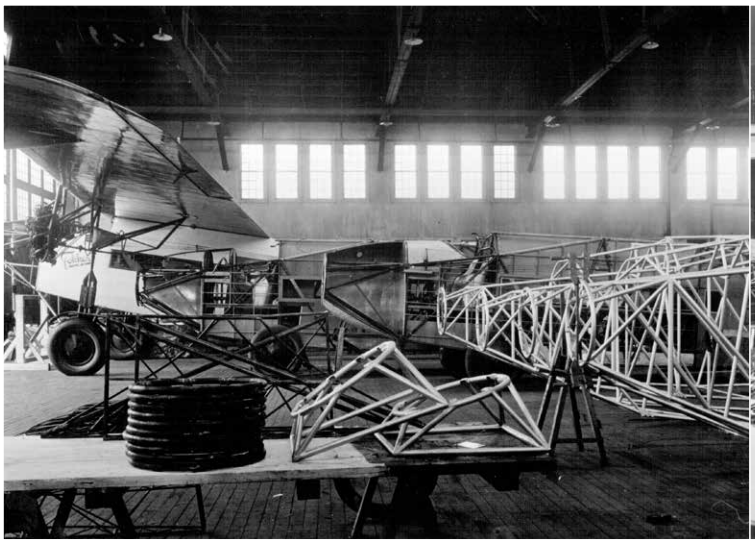
Discussions with the Engineering Department at McCook Field on December 16 also led to the presentation of a twin-engine bomber design called F.VII-D with a gun turret in the nose. It was to be powered by two Curtiss R-1454 radials and used a larger 800 sq. ft. wing. At the same time, Fokker played another card by presenting a design to the Air Service Heavy Bomber specification of July 1925, which had ended without a winner. In January 1926, this led to an order for a design study called XHB-2.[9] Fokker felt he was back on the road now.

Another prospect

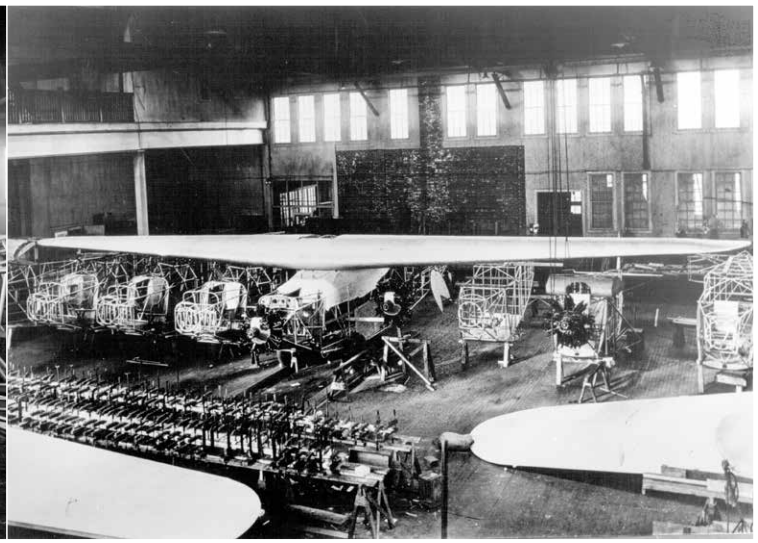
Earlier, the U.S. Post Office Department had asked for bids of private companies to operate an air mail service on several selected routes. Juan T. Trippe had, after some earlier airline adventures, incorporated Eastern Air Transport to bid for the new commercial Contract Air Mail (CAM) Route No.1 (New York -Boston). Besides Trippe, directors of the proposed airline were his old friend Robert Thach, Sherman Fairchild, Lorillard Spencer and L.L. Odell of Ford, Bacon



Sketches from Fokker 3-view drawings of each type.



Production at the plant of the Atlantic Aircraft Corp., with the F.VII/3m for Continental Motors Corp. largely completed and three fuselage frames for the future C-2 Trimotors in front, April 1926.



Factory shot with the early production of the Trimotors. The one in the center is supposed to be the future Chicago *for Colonial Air Transport.*

and Davis, both the latter also shareholders in Fokker's AAC. The U.S. Post Office, considering Eastern Air Transport to be too small, advised Trippe to merge with the second bidder on the route (i.c. Colonial Airlines) organized by investors from Connecticut and Massachusetts. On October 7, 1925, as result of a merger, Colonial Air Transport was organized and the same day the contract for the mail route was awarded[10] to be opened mid 1926. By using his entry to Anthony Fokker through the co-shareholders in AAC, Trippe convinced Fokker to use the Christmas period of 1925 to make together a trip in the original F.VII/3m to Havana, Cuba, to explore a future airline on the route. The Bulletin of the Netherlands Fokker plant soon even mentioned, rather prematurely, the proposed start of the New York-Havana line by Colonial with the type.

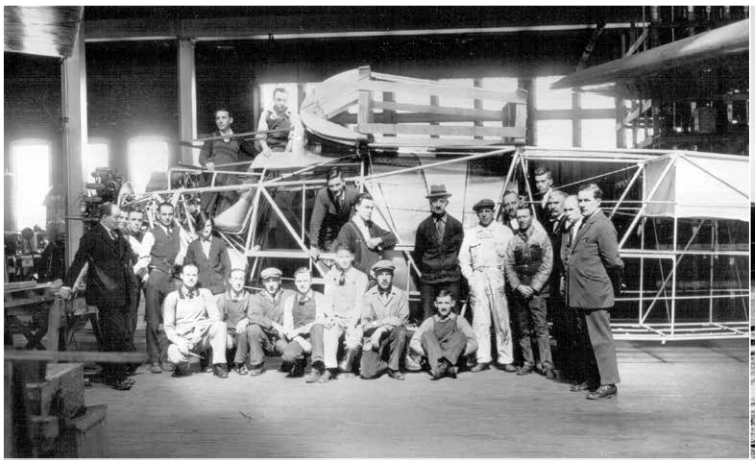
The U.S. Services convinced

When returning from the Havana trip, Anthony Fokker discovered that the original enthusiasm for his multirole aircraft by the Air Service finally had landed in a field of incompatible requirements. For example, the ambulance requested a widened fuselage to give sufficient walking room between the litters on both sides of the cabin. But the slow discussion (to impatient Fokker's opinion) with the Air Service was not in vain: an order for three transport C-2 Trimotors was soon promised. Later, also a twin-engined bomber as outgrowth of the F.VII-D was ordered.[11] However, none of the original AAC proposals were ever built other than the civilian follow-up orders for the already existing F.VII-A Trimotor transport, which were imported from the Netherlands.

The contact with Trippe bore fruit, when two civil adaptions of the military C-2 Trimotor with Whirlwind J-4B engines were

The first completed Trimotor with its early type open cockpit.

As the use for both Trimotors of Colonial AT on the CAM-1 route proved to be prohibited, availability for other functions were explored. Here it was equipped with Voice of the Sky' *apparatus.*



Proud workers with Anthony Fokker at the right posed in front of the Trimotor fuselage for the 'Greenland' flight of Byrd. Note the large fuselage tank.

Boston*, the second Trimotor for Colonial AT was up for sale after the first one was demolished by an accident. Afterwards bought by J.T. Trippe to open the Pan American Airways mail route from Key West to Havana, Cuba, with its early name* Key West.

ordered by him to be used by Colonial Air Transport (CAT) on the CAM-1 route. Havana turned out to be a step too far. However, the civil Trimotor contract was not without issues. Within CAT it soon became clear that Trippe had acted on his own authority by ordering the aircraft, and to make matters worse, the CAM-1 contract prescribed the use of single-engine aircraft and not Trimotors. Fokker did not accept a cancellation of the order, but production was slowed down as a delivery before the opening of CAM-1 on July 1, 1926, was no longer necessary. Two of Atlantic's single-engine Universals were ordered to cover the mail route.

To finalize the Air Service order took far more time than Fokker expected. The Air Service drew up specification X-1591 of February 6, 1926, an order for three C-2s (with serials AS 26-202/204) with a modified closed cockpit, a redesigned fuselage and Wright R-790 (Whirlwind J-5) engines. Differing now from the imported F.VII/3m, the U.S. factory seems to have assigned model number 7 to the Trimotor transport.[12] On February 23, 1926, the C-2 contract AC 753 for three aircraft at $ 30,000 each without spare parts was concluded. Engines and some equipment were to be delivered by the Air Corps. But the three fuselage frames remained idle in the Fokker plant for some months due to discussions with the Air Service on their detail design and the stress analysis. It was not until February 1927 that the first Air Service C-2 finally was completed.

The first civil Trimotor for Colonial Air Transport had been delivered in November 1926, but was only used sporadically after that. When Trippe again acted by his own in March 1927 in bidding for the New York-Chicago Contract Mail Route, he was fired and told to take both Trimotors (of which one still was to be delivered) with him. Needless to say, he lacked the money, but later bought the second plane of the Colonial order by his newly organized Pan American Airways, Inc. for the Florida-Cuba mail route.[13]

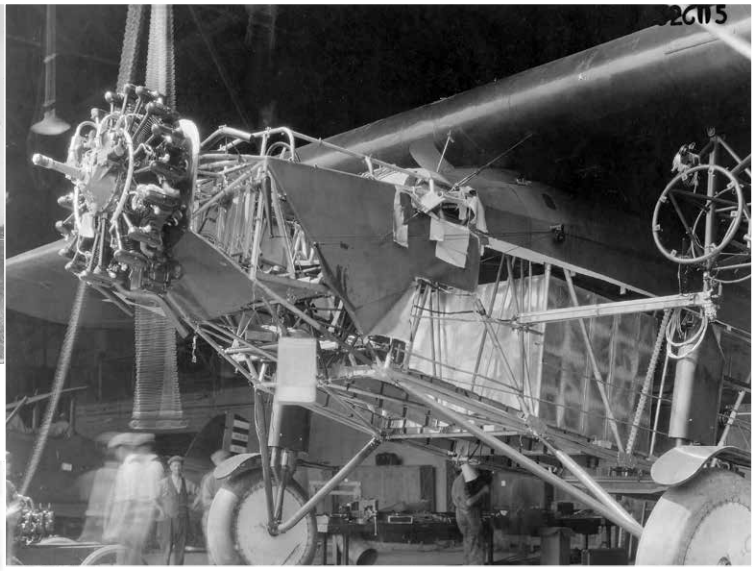
Triumph for the Trimotor

An earlier purchaser of Fokker aircraft also showed interest in the civil Trimotor. Cmdr. Richard E. Byrd, who had used the reconditioned prototype of the F.VII/3m for a flight in the North Pole region, wanted to gain further fame by being the first to fly from New York to Paris. At the time several participants were preparing to compete for the Orteig price on the first non-stop flight. Byrd hid his intensions by ordering a Trimotor for a "Greenland flight" and stipulated an unpainted delivery to avoid "flying with a Fokker billboard around his neck" for the second time. Fokker's orderbook now comprised six Trimotors, which soon grew to nine after a U.S. Navy order.

This was a period in which record breaking flights were being made world-wide. Within the Air Service, the demand to demonstrate their capability to make long-range flights was growing, too. This was, in part, stimulated by the redesignation of the Service into Air Corps by means of the Air Corps Act, signed on July 2, 1926, by President Coolidge.[14] The Commander of the Air Corps decided on October 1 to purchase a 'large wing' from Fokker to be installed on their first C-2[15]

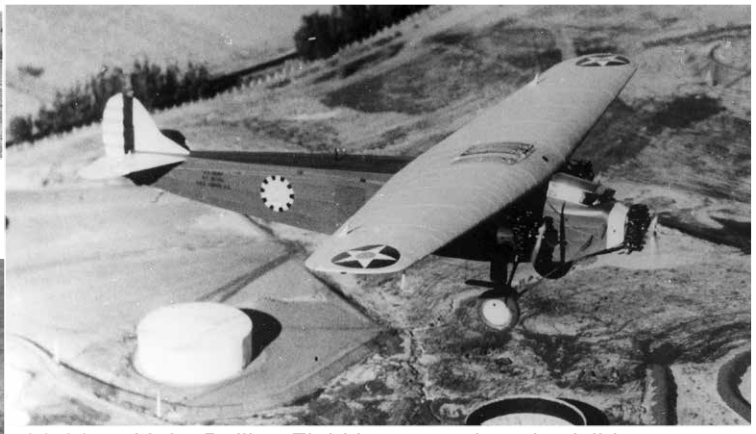
The completed Trimotor for Byrd, still unpainted and before its first flight in May 1927.

The first Air Corps C-2, 26-202, as it left the Atlantic Aircraft Corp. plant in April 1927.



Soon after its delivery, the first C-2 was modified at McCook Field for the long overwater flight to Hawaii. Note large fuselage fuel tank.

The Air Corps second C-2, 26-203, as modified for radio experiments. Note the three-blade nose propeller.



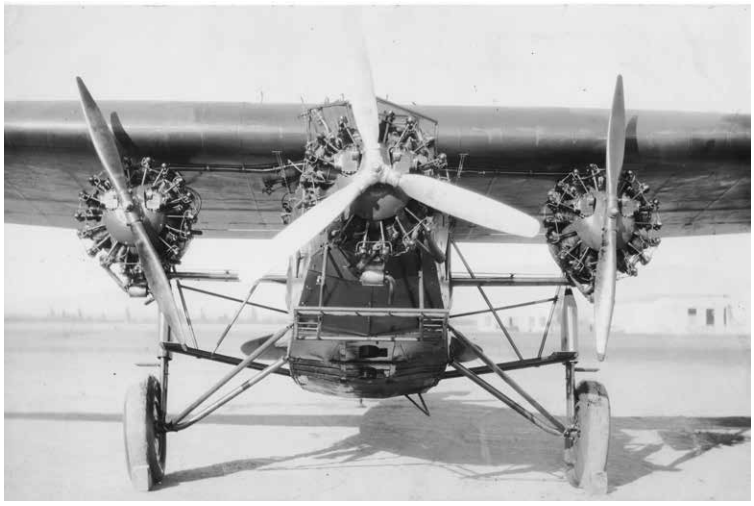
26-204 with its Bolling Field logo prominently visible.

The first TA-1 Trimotor for the U.S. Navy at the factory, still with its two blade propellers.

The US Navy was the first to fit a three-blade propeller on the type, as shown in this photo at Anacostia, D.C.

The first Air Corps C-2A, 28-119, completed as third of the improved Trimotors, easily being recognized by the larger wing with the rectangular center section.

The first two C-2A's ordered by the Air Corps were shifted to the U.S. Marines by urgent need in Nicaragua. The first one (A8007) is portrayed.



The position of the engines is shown in this front view of C-2A, 28-120, 'Question Mark', the most famous of the type. The trapezes to service the engines during the endurance flight early in 1929 are visible.

as part of the so-called PROJECT Z, a flight between the U.S. and its Hawaiian Territory. After delivery of the C-2 26-202 on February 22, 1927, the aircraft was flown to Mc Cook Field where project number P463 was assigned. In a short order, the Air Corps started to modify it for the long overwater flight with extra tanks and by removing all unnecessary weight. Called Bird of Paradise it wrote history at the end of June 1927 by making the first successful flight to Hawaii.

Within days, the third civilized Trimotor for Richard Byrd, called America, flew from New York to France, spanning the Atlantic Ocean. He had to let Lindbergh make the first flight to Paris due to a nose over on the Trimotor's first flight on April 16 with Anthony Fokker at the controls. It ended with injuries to the proposed crew of the Atlantic flight, damage to the aircraft and time-consuming repair afterwards. Byrd's flight ended at the Atlantic beach of Ver-sur-Mer in France, after being unable to find Paris. Yet, it was heyday for both Fokker and its Trimotor.

The second and third C-2s were delivered to the Air Corps in April 1927 and became primarily VIP transports operation from Bolling Field. As the Bird of Paradise stayed in Hawaii for years, both the other C-2s soon crossed the American continent and were entered in the National Air Races of September 1927, held at Spokane, Washington. The Material Division even planned to fit the large wing of the Fokker XLB-2 bomber with its two Wasp engines temporary to a C-2, thus providing a more powerful racer. This was not carried out as tests with the XLB-2 were not completed in time for the modifications.

The U.S. Navy also recognized the Trimotor's potential to support the Marines, fighting in Nicaragua against the rebel Sandino, and ordered three of them. On March 10, 1927, the order was approved by Bu Aeronautics of the Navy Department under contract 3443 for $122,450, again less engines and some instruments. The TA-1, as the aircraft were designated, configuration for the U.S. Marine Corps differed marginally from the C-2 and the trio were registered as A7561/7563. Although at the time, shipping to Nicaragua was the usual procedure, all three were flown to Nicaragua between November 1927 and February 1928. After their arrival they could be identified by a large 1, 2 or 3 number painted on the rear fuselages and did yeoman service for several years.

Enter the civil market

Although sales of the Trimotor model were initially limited to Colonial Air Transport, soon the commercial market in the U.S. would be served by Fokker. Encouraged by the sale of both the imported Dutch F.VII/3m (later also called Trimotor) and the three C-2 type civil Trimotors, AAC had developed a bigger Trimotor designated F-10 that, by coincidence, used the same factory model number viz. 10. The type was fitted with the large wing produced as alternate for the F.VII/3m prototype and by shifting its engines to the P&W Wasp (which nearly doubled the Whirlwinds horsepower) that facilitated a larger fuselage and load. In November 1927 Western Air Express ordered three of them to launch an airline in California in June 1928.

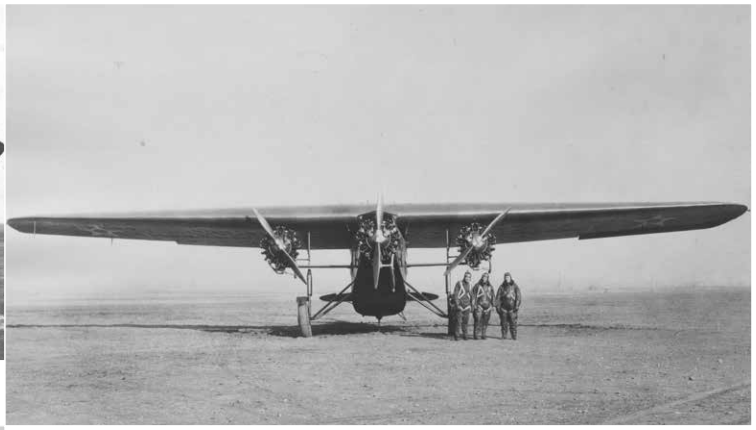
After building the first seven planes, the model was updated into a F-10A now called Super Trimotor, with a newly designed even bigger wing. It was produced at the new plant of the Fokker Aircraft Corp. of America in Glen Dale, West Virginia. The type became a winner in the then fast-growing airline market and even the Air Corps ordered one for the use of F. Trubee Davison, Assistant Secretary of War for Aeronautics.[16] In all 65 were completed and served on the lines of Western Air Express, Pan American Airways, Universal Air Lines (later American Airways) and Transcontinental & Western Air as well as corporate aircraft.

Military repeat orders

Within the Air Corps the idea had risen that the Trimotor could become its standard transport, Fokker kept pressing the Air Corps to order additional transports,[17] but again the discussions took their time. Not until all three C-2s had proven their merits along with shortages would another purchase was realized. In evaluating the C-2, the Air Corps preferred the "big wing" type, (to be recognized by its center piece with parallel leading and trailing edges. They finally finished laborious negotiations on the purchase of 10 aircraft, which incorporated a new "big wing" with increased surface along with other improvements. Contract AC822 was signed on October 14, 1927, but in the end, eight aircraft were purchased at $227,460.60 when two were diverted to the Navy. The type was called C-2A in the Air Corps with serials AC 28-119/128 assigned, but the last two serials never were used.

In early 1928, while AAC was busy fulfilling the order, the U.S. Marines urgently need to double their transport capacity in the fight against Sandino's uprising. An agreement was reached where the first two C-2As would be transferred to the U.S. Navy for service by the Marines in Nicaragua. The Navy got a procurement authority for them from the Air Corps and the original Navy order to AAC mounted $74,250.00. These Trimotors got the designation TA-2, were registered A8007 and A8008 and delivered from May 1928 on. As the Marine forces in Nicaragua had asked for three additional Trimotors, a third

A typical service scene of C-2A '42' at an unknown base.



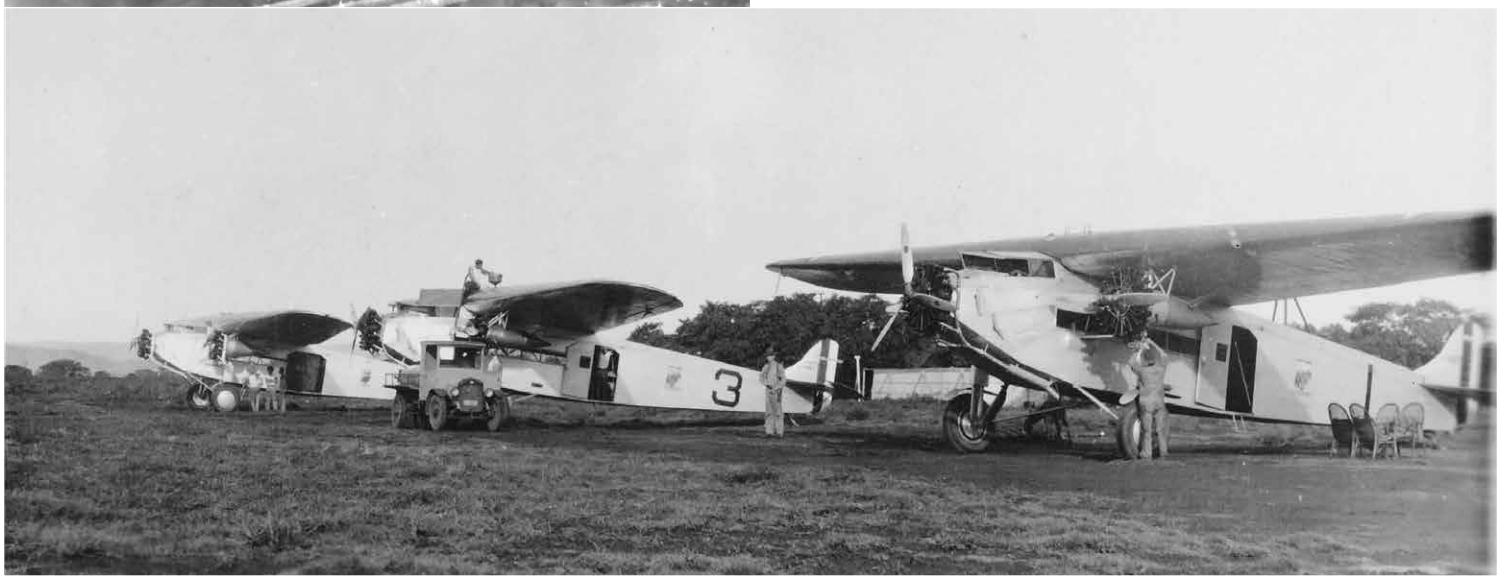
During the production of the C-2A it was decided to move the engines outboard to remedy vibrations due to overlapping propeller discs, seen here on 28-124.

The 28-126 as modified on Wright Field to take the new Wright R-975 engines and redesigned as XC-7 with tail number XP545.

The ill-fated TA-2 A8008 which crashed on its way to Nicaragua.

LEFT: TA-2, A8018, modified to take new Wright J-6 engines and fillets to the wing. This aircraft became RA-3 when the U.S. Navy changed the T in its designation system to R.

BELOW: Line up of three TA-1s in Nicaragua.



TA-2 with registration A8018 was ordered on Navy contract 8738 directly from AAC at a cost of $35,218.85. The fifth aircraft of the Air Corps order was substituted for this order, adding another C-2A on the end of the line. Deliveries of the C-2A to the Air Corps started in July 1928 with the last being completed at the end of the year.

A major miscalculation

The addition of three TA-2s did not bring the Marine Corps in Nicaragua all the extra capacity it hoped. The first TA-2 (with buzz number 4) soon met bad luck when it crashed within four months after its flight to Nicaragua. The second one, A8008, never even reached that destination. Nearly one month after its delivery, it crashed on June 23, 1928, near File, Va., on its way to Nicaragua, killing three crew members with another one seriously injured. The third TA-2, which got buzz number 5, met a better fate when it arrived in Nicaragua on August 24, 1928.

Even before the crashed A8008 was formally stricken from the U.S. Navy list, Maj. Halbert Payne, Fokker's representative in Washington, D.C., contacted RAdm. W.A. Moffett of the Navy's Bureau of Aeronautics (BuAero) to offer the sale of a replacement aircraft. As the need of the Marine Corps for transport was acute, Payne suggested that a 12th TA-2 fuselage[18] from the Air Corps order was, after some repair, available at the factory to ensure a quick delivery. Due to the urgent need for the aircraft, BuAero acted quickly when Fokker assured that the fuselage would be brought up to an "as new" standard. A proposed order for the new TA-2 serial A8157 was formulated in September 1928 under the same terms as used for the already delivered TA-2s, as a safeguard against a fuselage of substandard quality. Differing from their earlier purchases, the Navy wanted to have a P&W R-1340B (Wasp) engine fitted in the nose instead of the Wright R-790A (Whirwind J-5) to improve the aircraft's performance.

As BuAero had delegated the inspection at the Fokker factory to the Air Corps representative, it became known through him at the end of October 1928 that the specific fuselage that had earlier been rejected by the Air Corps had been repaired, but in a very bad way. Of course, BuAero was not amused, as was the General Inspector of Naval Aircraft (GINA), who advised not to contract on that basis. However, the urgent need for the aircraft apparently prevailed as on November 20 Moffett advised the Bureau of Supplies and Accounts to award the order to AAC. Thus, contract 10263 was signed on November 23, 1928, this time at a price of $39,320.00. Ten days later, the GINA Inspector found the reworked tail post of the TA-2 fuselage unacceptable and advised to reject it. After a fortnight, Fokker admitted to giving the fuselage a makeover and on January 4, 1929, BuAero inspected the reworked fuselage in Fokker's Passaic plant. Their report mentioned the repair done was excellent but suggested other considerations might be prevent acceptance. BuAero decided to forego the purchase, giving their reasons for not buying rejected Air Corps items in a letter of January 9. Anthony Fokker was furious and asked (from the Glen Dale, W.V., plant) for an explanation, but this was of no help. In the end, Fokker offered to build an entirely new fuselage, but this came too late. On February 19, the contract was cancelled, but not after another attempt by Anthony Fokker to change Moffett's mind. A Ford Tri-motor was ordered instead.

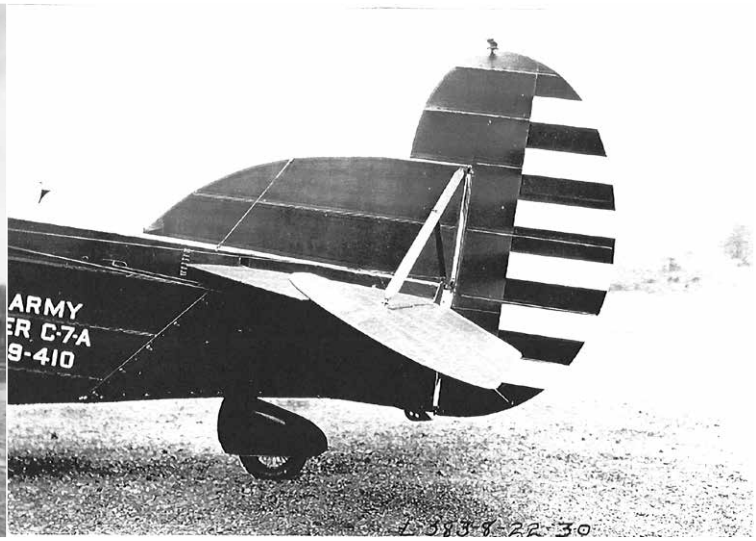
The C-2A/TA-2 improved

During its early service use, it became clear that the C-2A was plagued by vibration and flutter. After some time, it was discovered that this was caused by the overlapping propeller discs. Apparently, this also had appeared on the C-2 and TA-1, as both on the 26-203 and all the TA-1s the propeller of the center engine was changed to a three-bladed one of smaller diameter. The TA-2 was equipped with a three-blade nose propeller from the outset. On the C-2A this was first tried on the second aircraft, 28-120 by far the most famous of the type. Named Question Mark, it broke the world's endurance record in the early days of 1929 by refueling in the air. Later, the wing engines of the last four aircraft were moved 21" farther outboard, which solved problems. The type designation was not changed for this modification.

Both the Marines and the Air Corps soon found the C-2A/TA-2 slightly underpowered. On September 24, 1928, the Material Division published a study[19] that favored the reengine of the C-2A with the new Wright J-6 as soon as it was available. Instead of three times 220 hp for the R-790 engines, the three R-975 power plants offered 300 hp each and proved to have a better engine out safety margin than with two Wasp's. The Air Corps proposed another modification on November 14, 1928, to the NACA, which investigated at the time shrouding that would improve the airflow around the aircraft motor. On the three engines of C-2A 28-123 a so called NACA cowl was placed with the idea that such would improve the aircraft's performance. But for unclear reasons it did not, making Fokker believe that the NACA cowl was not an improvement and preferring the Townend ring in further developments. Later, it

At the request of the Air Service, the NACA tried to improve the C-2A's performance by fitting their cowling design around the engines. It proved to be unsuccessful to the underslung engines.

The first C-7A 29-407 as completed at the Glen Dale, W.V., plant, still with the original fin.



A close up of the fin modification to improve stability of the C-7A

was discovered that the airflow around both underwing engines caused airflow disruptions while the NACA cowl worked well with engines placed in the wing root.

With delivery of the first new Wright J-6 engines to the Air Corps around March 1929, C-2A 28-126 was modified by an engine change and its designation became C-7. After an evaluation, it was decided to let the Air Corps modify the other C-2As into C-7s, which happened to 28-119, -120, -123 and -125 in 1930. Regrettably two other C-2As were lost by engine trouble and one by high winds in the first half of that year and did not receive the improvement. The modified type served faithfully until mid-1933. Also, the U.S. Navy modified three of the Marine Corps aircraft by fitting the more powerful Wright R-975 engines to them. A7561 and A7563 became, for a short time, known as TA-3 and together with A8018 were redesignated RA-3 when the T for transport in the Navy designation system was changed into an R.[20] This led to two short wing RA-3s and one with the long wing, using the same designation. Simultaneously, early 1931, A-8018 was further modified at the Navy Yard in Philadelphia by adding Townend rings to the engines and modifying the engine pods. In this form it served until end 1932, while the use of the other RA-3s ended in 1931.

The final Trimotor Model

Just as within the Air Corps, the Fokker company had recognized the potential of the new Wright J-6 and in November 1928, Fokker launched a new trimotored civil airliner with a slightly smaller capacity.[21] Although the F-10A production at the new Glen Dale plant came (after a slow start) just into move Fokker apparently believed in a market for it. By reducing the number of passengers to eight in a shortened F-10A fuselage, with the J-6 Whirlwind, its base price of $ 49,000 was substantially less than the Wasp powered F-10A at $ 67,500. The new type was called F-9 (or F.IX) and originally to be fitted with the Dutch large wing, as for the early F-10s. During its development this was changed into the proven "big wing" of the military C-2A/TA-2. The F-9 type was still offered as an eight-passenger cabin monoplane as part of their civil program for 1930 in the Fokker Aircraft Corp. of America (FACoA) brochure of November 1929. Earlier in 1929, with a growing volume of passengers, the airlines preferred ordering the larger F-10A, but soon regretted their overcapacity after the Wall Street crash in October 1929. No civil F-9 was ever built.

Still in fiscal year 1929, the Air Corps was convinced of the merits of the modified C-2As and ordered the military counterpart of the F-9. Order 2288 of June 13, 1929, was comprised of six aircraft to specification 1658A, to become AC 29-407/412 and designated C-7A. As the type was the first after the F-14 parasol to go into production, factory model number 15 was assigned with msn 1501/1506. Fokker Aircraft Corp. of America produced the aircraft in their Glen Dale, W.V., factory, along the last of the F-10A production line. Deliveries started in March 1930 and the last C-7A was handed over in July. A decision of the FACoA Board to build 10 additional F-10As (msn 1064/1073) only led to the completion of msn 1064, serving as prototype for a Marine Corps order as RA-4 with serial A8841. Despite several modifications, which took about a year, the type was not accepted, returned to the factory and eventually demolished. Its longitudinal stability still proved to be unsatisfactory even after a series of changes.

When the first C-7A appeared it still had the small fin of the earlier Trimotor types. Like the F-10A, its stability when flying without load was a common problem compared to the development of the origina,l well-balanced F.VII-3m. After flight testing it was decided to fit a large fin, as had been used earlier used on the XLB-2 bomber. At the factory in Glen Dale, the so called "XLB-3" (a twin engined F-10A) was still available with such a fin that was fitted to the first C-7A. This modification proved successful and the other production C-7As

got this fin from the outset.[22] The aircraft were designed to carry up to six litters, which were to be loaded by the "litter opening door" in the fuselage hatch of the cabin's front as earlier proposed on the F.VII-B project. As early of May 1,1930 Fokker's vice President of Sale, E.V. Rickenbacker, started discussions with the Air Corps on further C-7A orders, but new developments in construction prohibited such. Even a study to fit floats on the aircraft brought no further interest in it.

Epilogue

The Trimotor transports were the workhorses of the Marine Corps and the Air Corps. They served in a time when flying was far more unique but also less intense than the use of their current counterparts. Also, their reliability and demand for maintenance was incomparable with current standards, as was their productivity. Yet, they played an important role in the development of air transport of the period and especially the Trimotor in the Marine Corps service in Nicaragua did yeoman service with an average use of nearly 50 hours each month. The six C-7As missed the glamorous career of some of its forebears but were reliable assets in the Air Corps transport role for more than four years, with an average flying time of around 30 hours each month and amply surviving their commercial counterparts. Their role finally ended when the three engines that Anthony Fokker used to promote safety could be guaranteed by two engines. The role of the trimotor in the U.S. faded away, though production of the F.VII/3m for the world's airlines continued in the Netherlands until 1932. ✈

Endnotes

1 The US Army Air Service ordered two F.IV/T-2 transports and two V.40 Combat Aircraft, while the US Navy signed for three FT Torpedo floatplanes

2 Letters found in the files of the Smithonian Institution/ National Air & Space Museum

3 Journal AAHS Winter 2010 pp 258/265

4 Platz at the Veere plant already had assigned the F.VI designation to the production of the PW-5 fighter for the US Army Air Service

5 At the same time the production of the Fokker CO-4 was discussed with the Air Service

6 It is nearly impossible from the large variety of information to deduct exact dimensions of those wings. Factory information and official reports mentioned the standard wing spanned 63' 3" with an area of 646 sq ft and the larger one had a span of 71' 3" and an area of 718 sq ft

7 Every stage of the Tour he tried to arrive first notwithstanding the daily start of aircraft at intervals and reliability (not speed) was purpose of the Tour

8 The letter of Anthony Fokker to the Commander US Army Air Service of December 14, 1925 instantly got the intended follow up

9 Contract 933 included a stress analysis, drawings and two wind tunnel models. Early 1927, the work on it was stopped

10 An American Saga by Robert Daley (Random House, 1980), p.15

11 The XLB-2 was ordered on May 28, 1926, originally to be fitted with Allison V-1410 engines (air cooled inverted Liberty's) by AS contract 926 for $ 48,000

12 This model number was suggested by Peter Bowers when the second civil Trimotor showed 704 as its factory number in the civil license application

13 Original registered NC53 but formally changed into NC55 when the Aviation Branch of the Department of Commerce mistakenly supposed that the original NC53 had crashed earlier

14 Simultaneously, the Engineering Division at McCook Field became the Air Corps Material Division.

15 The wing had a span of 72' 3" which differed from the only other large wing at the time used for the F.VII Trimotor 'Detroiter' as used by Wilkins which span was mentioned to be 72' 8"; Fokker's engineers could not explain the difference (if it was)

16 Ordered by AC2210 on March 16, 1929, msn 1023 was delivered in April 1929 with r/n AC 29-405

17 In a letter of June 1, 1927, AAC offered to deliver 20 additional C-2's to the AC, eventually to be fitted with the bombs rack as used on the XLB-2. Fokker called the type C-2B

18 Ten from the AC order, with two diverted to the US Navy, and the eleventh on a separate US Navy order

19 Compared were the performances with three J-5 engines, two Wasp engines or three J-6 (R-975) motors

20 To distinguish the difference of the Transport and Torpedo designation, the R for transports was introduced around early 1931

21 A FACoA Standard Specification form of the F-9 Trimotor was dated November 1928

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