



Stearman X100 in its original configuration at the Stearman Aircraft Co. on March 14, 1939. (Photo from the Kenneth D. Wilson collection)

The Forgotten Bomber, Stearman's X100/XA-21

By Thomas E. Lowe

During the latter part of the 1930s the U.S. Army Air Corps (USAAC) was formulating an interest in obtaining a new light attack bomber, which would be capable of destroying an enemy with bombs and then be able to follow that up with strafing to attack ground troops. Consequently, in March, 1938, it issued Circular Proposal 38-385, which outlined the requirements for a twin-engine airplane that could carry up to 1,200 pounds of bombs at a minimum speed of 200 mph and have a range of 1,200 statute miles. A prototype aircraft built by the submitting companies was to be delivered to the USAAC by March 17, 1939.

These prototype aircraft that would be constructed by each company that wished to participate in the upcoming competition were to be built at the company's own expense. The USAAC would not cover the cost. This program represented a change in policy for the USAAC. Previously the USAAC would present technical data and performance specifications to the participating companies before they actually began the construction of the aircraft.¹

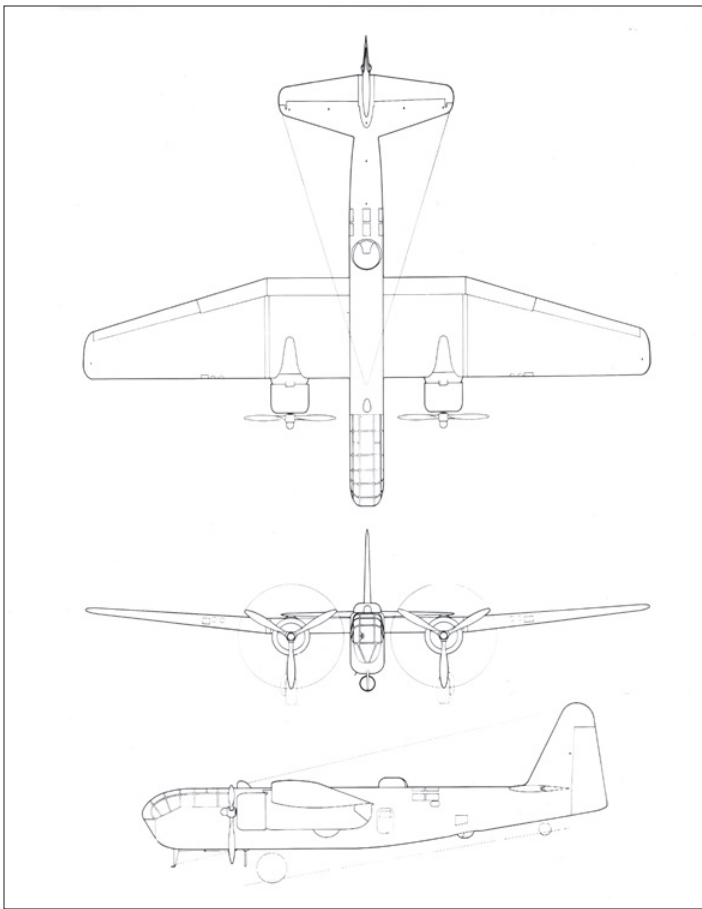
At the Stearman Aircraft Co. in Wichita, Kan., the design work on their proposed bomber began in 1938, shortly before the company was forced by Government decree to become the Stearman Aircraft Division of the Boeing Airplane Company. Preliminary designs were subsequently evaluated by engineers at Boeing in Seattle, Wash., as well as by those at Stearman in Wichita. The general arrangement of the proposed airplane

was determined by Boeing, but it was decided that it would be built in Wichita.²

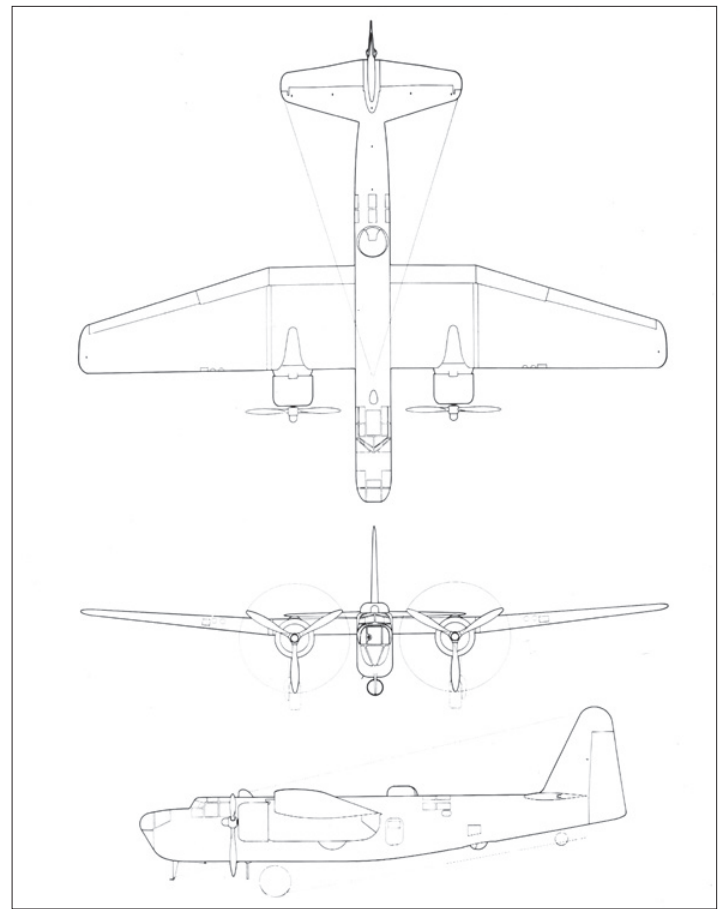
The Stearman X100, construction number (c/n) 10000,³ was unlike any other airplane that the Stearman Co. had ever built. Specifically, it was a twin-engine, all metal monoplane. Its design features included a flush-riveted semi-monocoque fuselage; fowler-type wing flaps and an electrically powered retractable landing gear.⁴ It also incorporated integral fuel tanks; full-feathering constant speed three bladed propellers and sealed compartments in the outer wing panels, central fuselage and tail section for flotation in the event of a water landing.⁵

The plane was powered by two new and unproven Pratt and Whitney R-2180-S1AG (Army R-2180-7) "Twin Hornet" engines rated at 1150 hp that could be boosted to 1400 hp for takeoff. They were an enlarged version of the R-1830 engine originally developed for the Douglas DC-4E. Only two airplanes were to utilize this new engine – the Stearman X100 and the North American XB-21.⁶

The X100's most notable design feature was the contour of the cockpit enclosure in the nose of the fuselage. In the interest of streamlining, the nose contour made an unbroken curved line faired into the top of the fuselage. This was remarkably different from the standard "stepped" windshield configuration of most bombers and transports of that era. A similar concept would later be employed by Boeing in the design of the B-29 Superfortress.



*Three view aircraft drawing – original nose configuration.
(From the Kenneth D. Wilson collection)*



Three view aircraft drawing – modified stepped cockpit configuration. (From the Kenneth D. Wilson collection)

This unique cockpit configuration provided for a standard aircrew of three — pilot, bombardier and a radio operator/gunner. But there was sufficient remaining space in the fuselage for additional crew stations as needed. The pilot and bombardier sat in tandem beneath the enclosed canopy and the radio operator/gunner was positioned aft and had access to from four to six .30 caliber machine guns.⁷

A folding seat and a set of folding rudder pedals adjacent to the right of the pilot's seat provided a station for a co-pilot. A throw-over type flight control column allowed the airplane to be flown in level flight from the right seat. However, the engine and propeller controls could only be operated from the left seat.⁸

All of these features combined underscored a significant advancement in the technology and design philosophy, as well as in the manufacturing capabilities, as now established by the Stearman Aircraft Company.

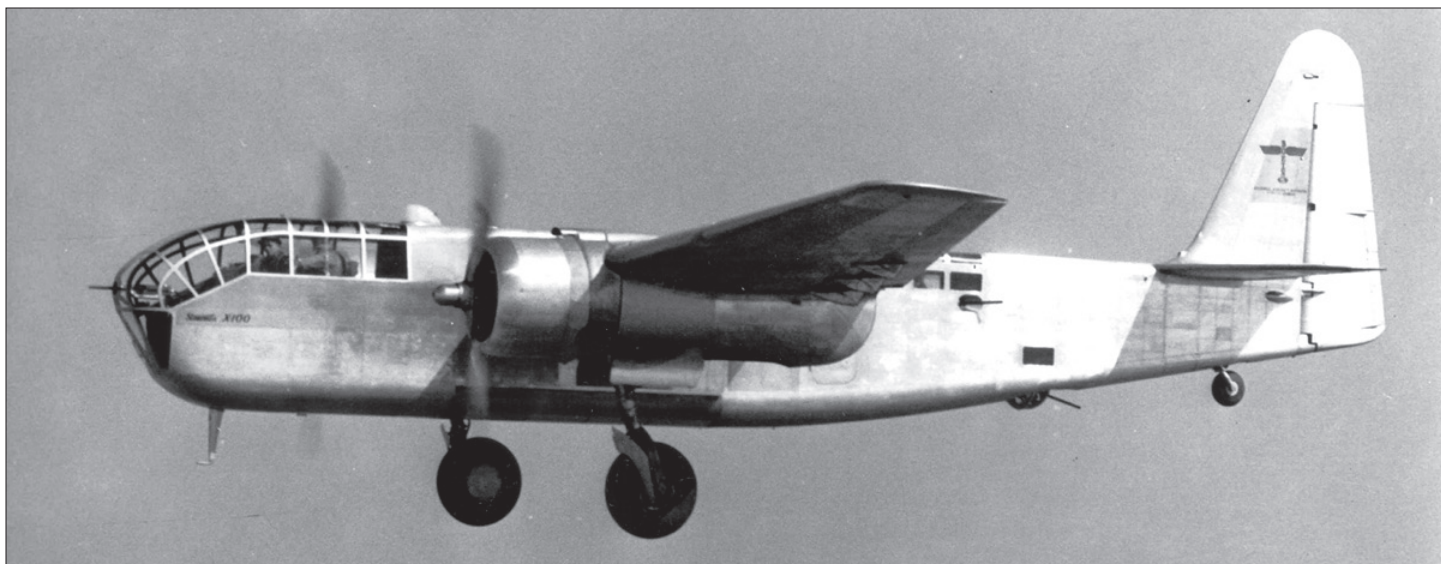
Five aircraft manufacturing companies responded to the USAAC request for proposals including: the Boeing Airplane Co., North American Aviation, the Martin Co., Bell Aircraft Co. and the Douglas Aircraft Co. After reviewing the proposals and assessing the competition's proposed designs, Bell withdrew from the competition. The remaining four companies all

proceeded with their designs and built prototype aircraft.

The Stearman X100 design team of 58 engineers consisted of 55 Stearman Co. members and five from Boeing in Seattle. Initial work on a mock-up and a wind-tunnel model were begun immediately in March, 1938. In April, the first of the drawings were forwarded to the Stearman plant and by September 1938, the remaining majority of the blueprints had been sent to Wichita. The completed airplane was rolled out of the factory on January 25, 1939.⁹

The first test flight of the Stearman X100, c/n 10000, was conducted on March 3, 1939, by Boeing test pilot Edmund "Eddie" Allen and Stearman's Chief Experimental Test Pilot, David "Deed" Levy. The flight time logged was one hour and 40 minutes.¹⁰ Five more test flights that were subsequently logged through March 8, 1939, brought the total flight test time flown at Wichita to seven hours and 55 minutes. On March 14, 1939, the X100 was flown to Wright Field, Dayton, Ohio, by "Deed" Levy. Flight time enroute non-stop was three hours and 15 minutes. The total flight time on the X100 upon its arrival at Wright Field was 11 hours and 10 minutes.¹¹

The Stearman X100 was designated as the XA-21 by the USAAC and assigned the military serial number (s/n) of 40-191. It began a series of test flights by Army pilots against



Stearman X100, c/n 10000, in flight at Wichita, Kansas. Note the positions of the pilot and co-pilot. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)

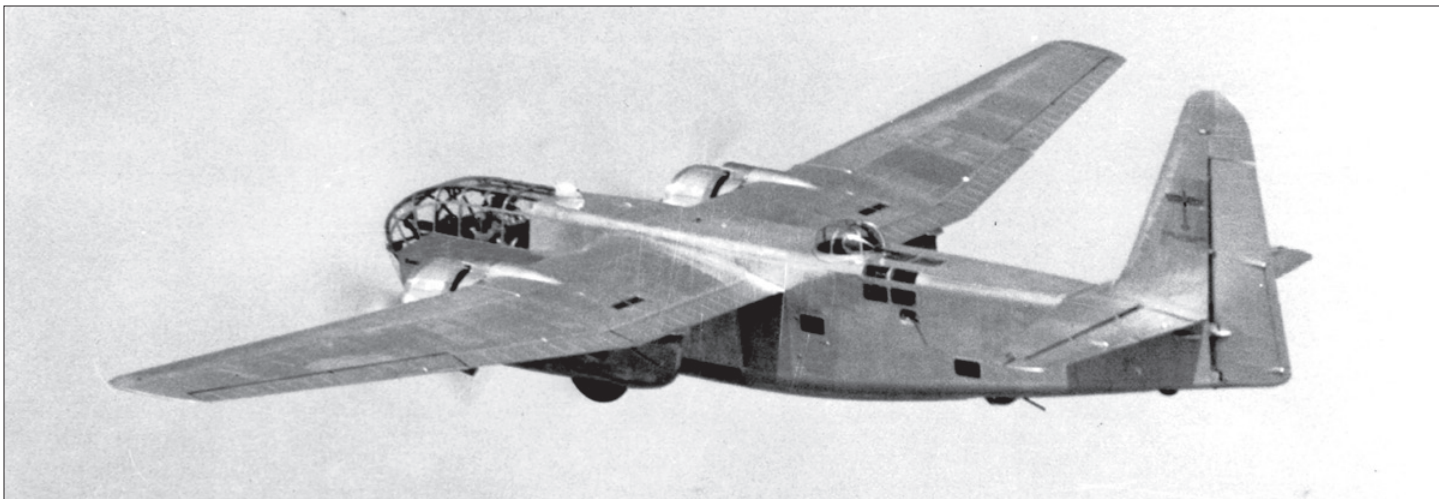
its competitors, the Martin Model 167 Maryland and the North American NA-40. The NA-40 would serve as the basis of the designs which would evolve into the famous B-25 Mitchell. The fourth entrant, the Douglas 7B, which eventually would be constructed as the A-20 Havoc, had crashed a few weeks before the trials begun and thus was not available for evaluation. On April 11, 1939, the prototype North American NA-40 crashed during a demonstration flight at Wright Field. Problems had been encountered with its original Curtiss electric propellers and the Army test pilot had violated the instructions that had been issued that prohibited single-engine operations in it until new Hamilton Standard propellers were installed. There were no injuries as a result of this accident, but the competitive field was reduced to only two airplanes.¹²

Ironically, all of these aircraft were considered by the USAAC to be obsolete by the time they were evaluated because the USAAC had already increased the requirements for the proposed attack bomber. Back in January 1939, the USAAC had issued another new proposal which superseded the original Circular Proposal 38-385. As a result of that the Douglas DB-7/A-20 Havoc had already been awarded a production contract based solely upon drawings and technical data.

The Stearman X100/XA-21 was flown twice during the evaluation trials by David "Deed" Levy, Stearman's Chief Experimental Test Pilot. The first flight was on March 27, 1939, for 30 minutes and the second on March 28, 1939, for one hour. Most likely the purpose of these two flights was to familiarize Army pilots with the airplane. But "Deed" Levy did



Right rear view clearly shows the gun turrets on the upper and lower fuselage. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)



Close inspection of this in-flight photo shows the tandem positions of the bombardier and pilot. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)

not record any remarks to that effect in his pilot logbook.¹³ The airplane remained at Wright Field for almost another month and undoubtedly was flown by Army test pilots during that time.

After the flight tests were finalized the results of the competition were considered to be inconclusive and neither the Stearman XA-21 or the Martin XA-22 were declared as the winner. This decision resulted primarily due to the previously noted fact that the USAAC had significantly increased the performance requirements for the new light attack bomber back in January, 1939. That, of course, was during the time period in which all the initial entry prototype aircraft were already being built.

In a comparison of the two aircraft, the Stearman XA-21 was reported to be 16 mph slower than the Martin XA-22, but it could carry twice the bomb load.¹⁴ The bomb bay of the XA-21 was another unique feature of its design and its bomb load was quite impressive for that time period. The single

bomb bay could be equipped with the standard USAAC bomb racks that could carry varied bomb loads up to a single 1,000 or 2,000 lb. bomb.

The special feature of the XA-21's bomb bay was that it also could accommodate egg crate style bomb chutes that held 90 vertically positioned 30 lb. bombs.¹⁵

However, the deciding factor in the evaluation of the Stearman XA-21 probably was the USAAC's dissatisfaction with the curved glass contour of the fuselage nose. "Deed" Levy commented upon this by stating, "The night landings were really hairy due to lights reflecting under all that glass."¹⁶

Even though neither the Stearman XA-21 nor the Martin XA-22 received a contract from the USAAC, the Martin Co. proved to be the big winner at that time. Following the competition's inconclusive completion, its Model 167 Maryland received export contract orders from France and England. Although this airplane was already obsolete, or at



Stearman X100, c/n 10000, at the Stearman Aircraft Co. in 1939. The insignia on the vertical stabilizer is the Boeing insignia with the words "Stearman Aircraft Division" below. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)

least obsolescent by 1940, it performed well in combat in the early days of WWII for these two countries. The Stearman Co. was the big loser in this scenario and did not receive any orders from the USAAC or any other foreign country for a production version of the XA-21.

The Stearman X100/XA-21 was flown back to the factory in Wichita by "Deed" Levy on April 25, 1939. Flight time enroute non-stop was 4 hours and 15 minutes.¹⁷

During June and July, 1939, modifications requested by the USAAC were made to the XA-21. Foremost among these was the conversion of the glass cockpit nose enclosure into a traditional styled "stepped" windshield configuration.¹⁸ The final two test flights of the X100/XA-21 to check these changes were flown by "Deed" Levy on August 23, 1939, for 1 hour and on August 25 for 40 minutes.¹⁹

The U.S. Army Air Corps eventually purchased the XA-21 under contract W-535-13074 on July 19, 1939, for \$331,387. It was officially accepted by the USAAC Representative at the Stearman factory, Maj. Raymond G. Harris, on September 1, 1939.²⁰ Prior to that occasion "Deed" Levy had conducted the final test flight of the X100/XA-21 at Wichita, before its official acceptance by the USAAC, for 1 hour and 30 minutes on August 28, 1939.²¹

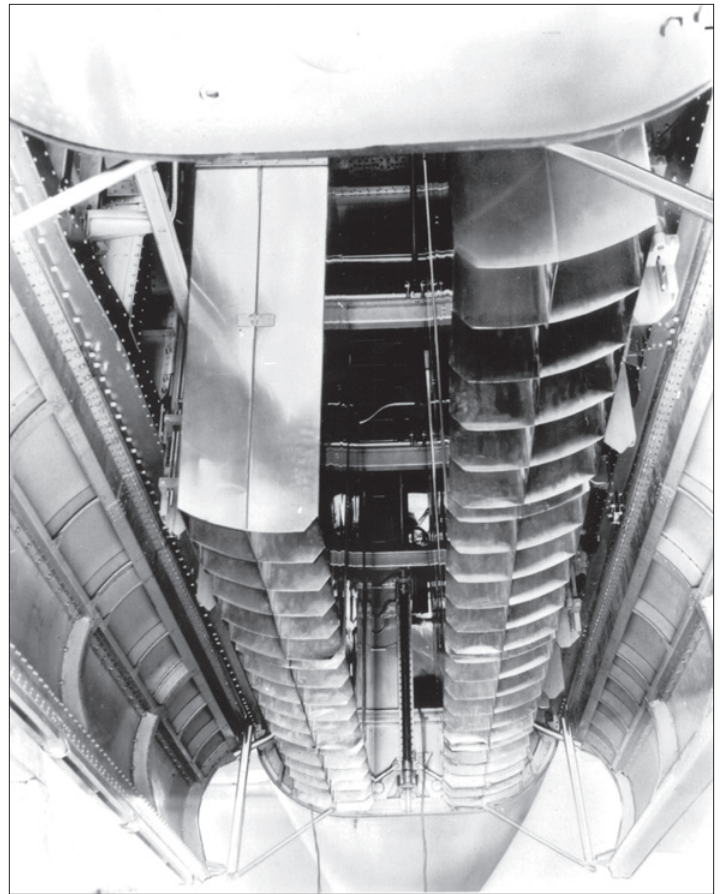
On September 1, 1939, XA-21, s/n 40-191, was flown to Wright Field, Ohio, for its initial assignment for experimental testing. There it would commence an odyssey of varied assignments to locations throughout the U.S. where it was used for various projects. For an example, while at Wright Field it was used in tests of smoke screening techniques using four chemical smoke generators mounted in racks on the undersides of the outboard wing panels.²²

In July, 1940, the XA-21 was assigned to the 24th Bombardment Squadron (Light), which was part of the short lived Air Corps Proving Ground Group at Maxwell Field, Montgomery, Alabama. The 24th Bombardment Squadron had been activated as a test squadron for light bombardment aircraft, but it was disbanded in the spring of 1942 in a reorganization of USAAF operational testing units. However, the XA-21 did not last very long in that assignment anyway before it was returned to Wright Field only a month later in August, 1940. It remained there until November, 1940.

Later that November it was sent on a temporary duty assignment to Orlando Air Base, Orlando, Fla., for a period of time and thereafter once again returned to Wright Field who in turn sent it back to Maxwell Field. It was then once again assigned to the Orlando Air Base on November 29, 1940.

The XA-21 remained at Orlando Air Base until July 1941, when it was transferred to Eglin Field, near the small town of Valpariso, Fla., on another temporary loan status. A month later on August 29, 1941, it was once again assigned back to Wright Field in Ohio. There it immediately was re-assigned back to Eglin Field where less than a month later, in September 1941, it returned to Wright Field once again.

During that time period from July 1940 to September, 1941, when it had embarked on a nomadic odyssey of weapon testing missions back and forth between Wright Field, Orlando Air Base and Eglin Field, it apparently had enjoyed a brief stint at



The bomb bay of the X100/XA-21 while configured to hold ninety (90) 30 pound bombs in the "egg crate" style bomb chutes. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)

XA-21 Technical Data

Span: 65 ft.

Length: 53 ft. 9.15 in.

Height: 12 ft. 5 in.

Power Plant: Two Pratt & Whitney R-2180-7, 14-cylinder Twin Hornets rated at 1150 hp at 2,350 rpm (normal at 7,000 ft.) and 1,400 hp at 2,500 rpm (takeoff) using Hamilton Standard 3-bladed, constant speed, full-feathering propellers

Wing Area: 607 sq. ft.

Gross Weight: 18,230 lbs.

Empty Weight: 12,760 lbs.

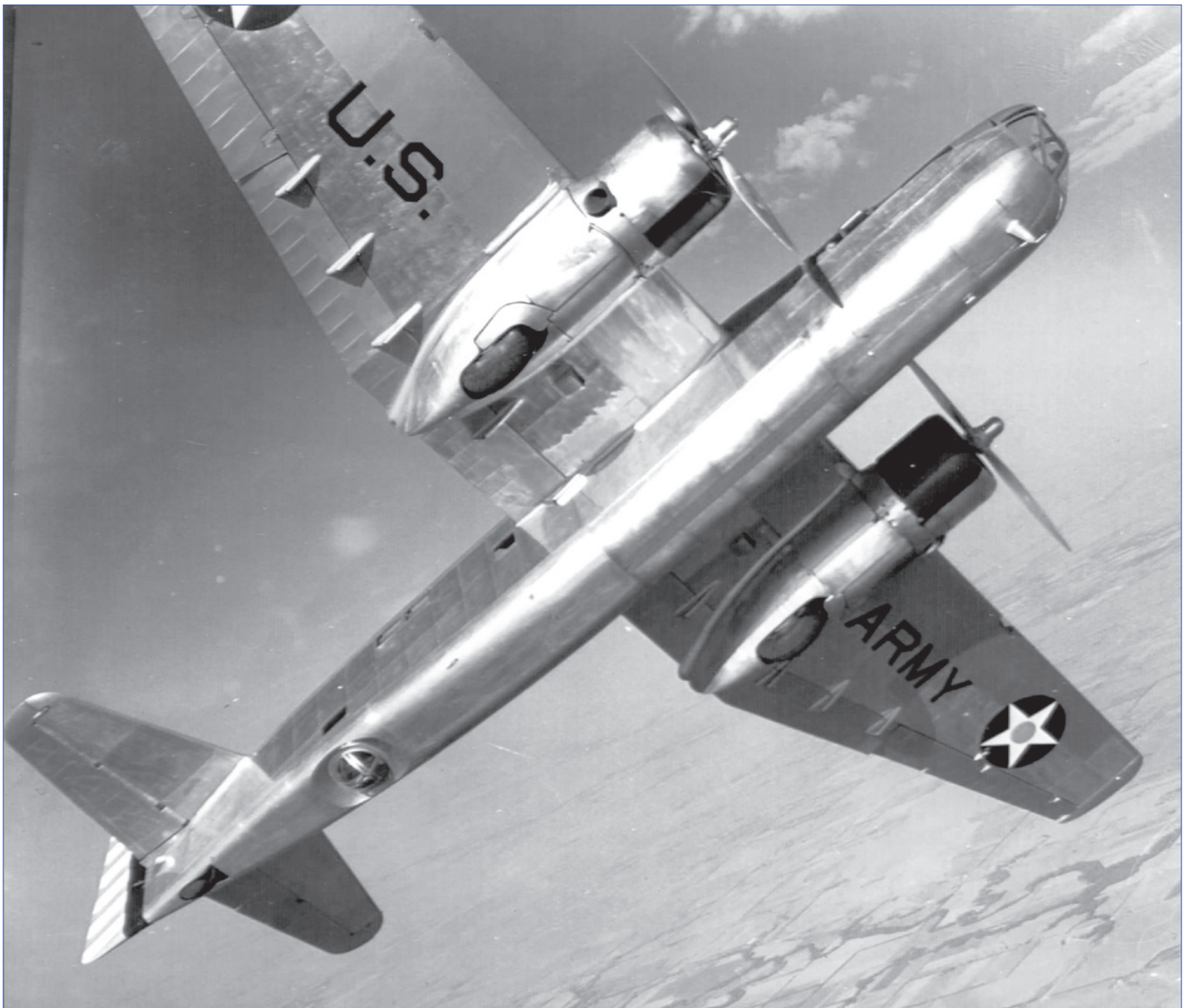
Max Speed: 275 mph at 5,000 ft.

Cruising Speed: 200 mph

Service Ceiling: 20,000 ft.

Range: 1,200 miles

Armament: 6 x 0.30 cal. Machine guns. 2,700 lbs of bombs



Underside view displays the clean lines of the fuselage. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)

the famed Aberdeen Proving Ground in Maryland. There is no official record of when, why or for how long it may have been there. The only reference to this event was a hand-written one word comment, "Aberdeen," on its official Individual Military Airplane Record Card.

Once again back at Wright Field the XA-21 was nearing the end of its flying days and on March 21, 1942, it was assigned to its final location at Keesler Field, Biloxi, Mississippi.²³ There it was utilized as a mechanic's trainer in the AAF Technical School.

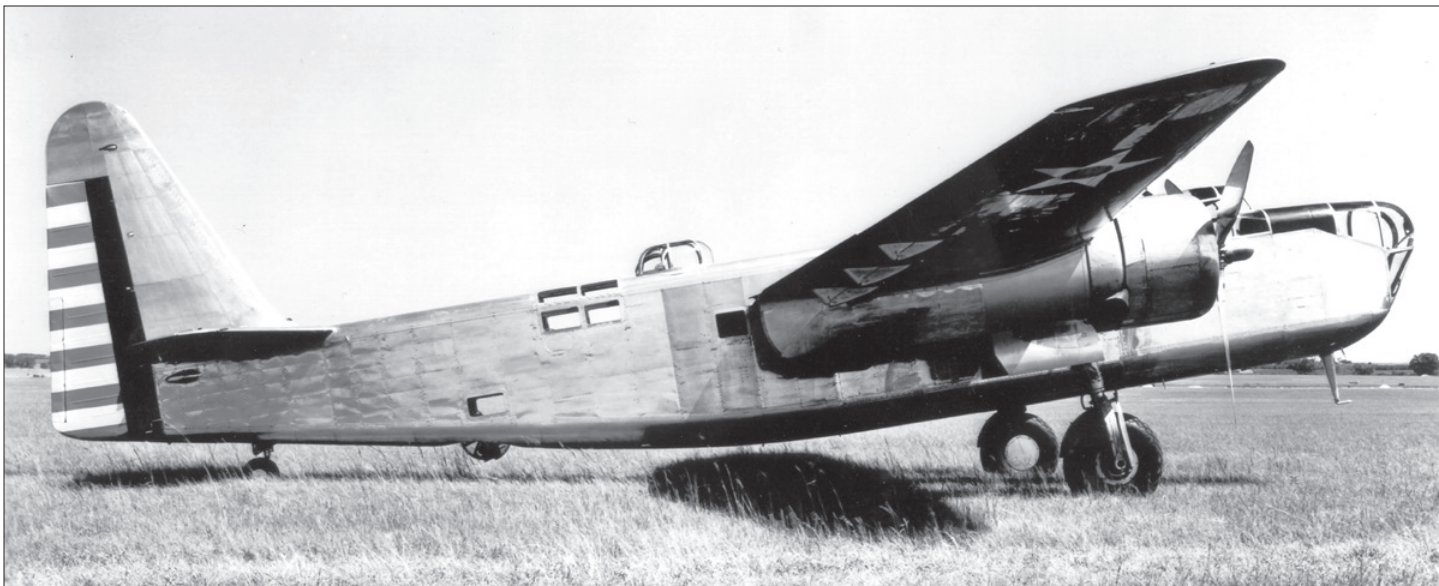
Stearman XA-21, s/n 40-191, was officially placed into Class 26 status at Keesler Field on April 14, 1942.

Total military flight time on the airplane was 111.9 hours. "Deed" Levy had flown the X100/XA-21 for 20 hours and 5 minutes, so the total recorded flight time on it when it was

finally grounded was 131 hours and 59 minutes. It remained in the Mechanic's Technical School as a training airframe for the next two and a half years until September 19, 1945, when it was stricken from its military record and presumably scrapped.²⁴

The failure of the Stearman X100/XA-21 to receive a production contract from the USAAC was not a major loss or setback to either the Boeing Airplane Co. or to the Stearman Division of Boeing. The Stearman factory in Wichita was already nearly overwhelmed with business for its Model 75, PT/N2S primary trainers at that time and it fully anticipated even more orders for them to come in the future as WWII approached.

The Stearman X100/XA-21 clearly was an inferior aircraft compared to the Martin Model 167 Maryland which did obtain export orders from France and England. The later bombers,



The modified nose configuration and locations of the upper and lower gun turrets are well shown in this photo. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)



Good view of the modified "stepped" cockpit configuration and the engine installation. The Stearman factory is in the background. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)



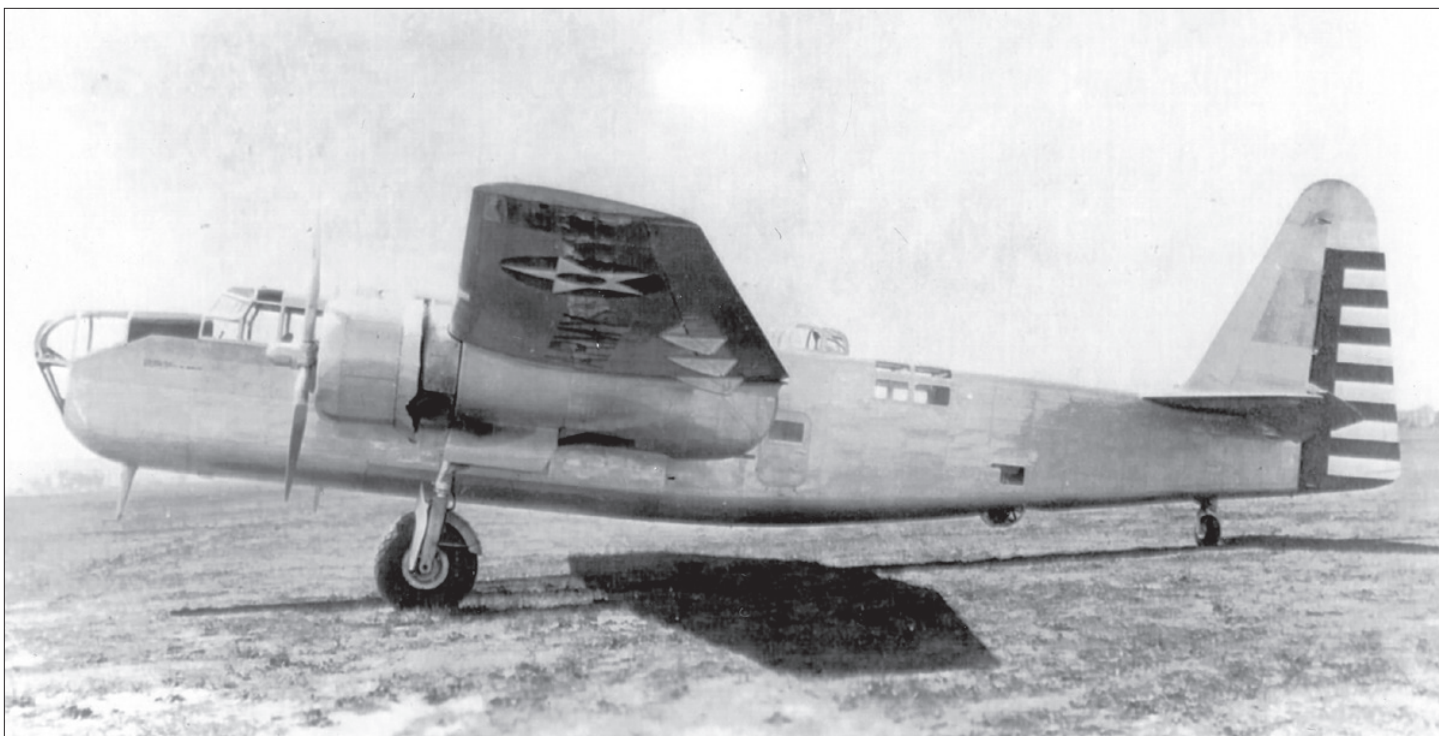
The modified “stepped” cockpit configuration shows well in this photo of the XA-21 parked in the grass at the Stearman factory. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)



The Stearman XA-21, sporting a war camouflage paint scheme, on display at Wright Field in 1940 or 1941. Note the four chemical smoke generators on under wing racks. (U.S. Army Air Corps photo from the Kenneth D. Wilson collection)



Modified Stearman XA-21 at the Stearman Aircraft factory. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)

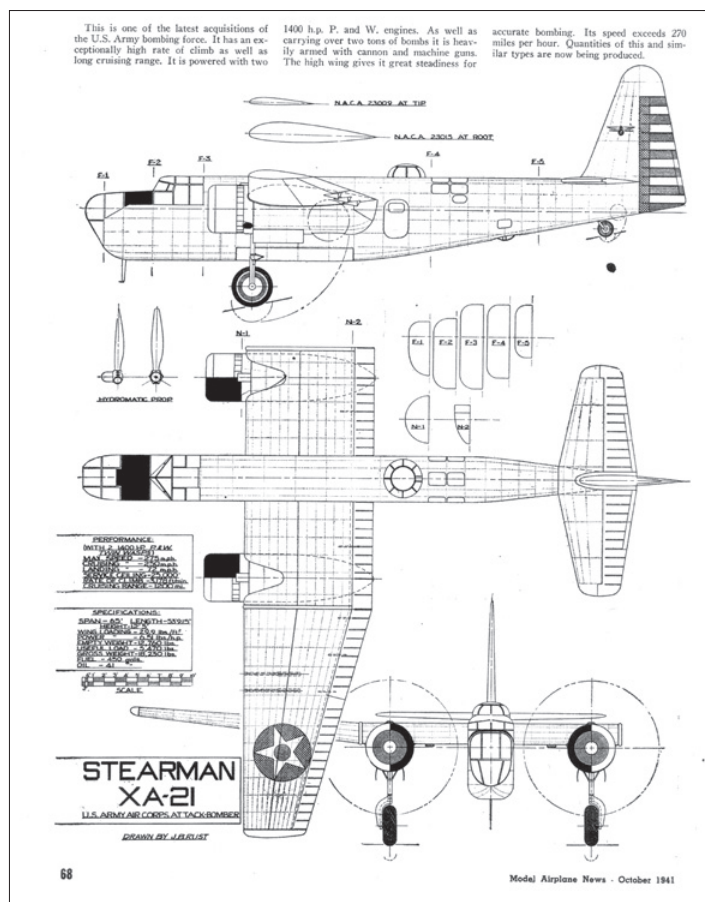


Left side view shows the conventional stepped cockpit design of the modified XA-21. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)

which were built in large quantities, the Douglas A-20 Havoc and the North American B-25 Mitchell, went on to establish outstanding combat records in all theaters of war world-wide during WWII. They have become icons in the history of famous U.S. WWII aircraft, while the Stearman X100/XA-21 has faded away to become a little-known and mostly forgotten blip on the pages of aviation history. →

Notes and References

1. Edward H. Phillips, *Stearman Aircraft, A Detailed History* (North Branch, Minnesota: Speciality Press 2006), p. 134.
2. *Ibid.*
3. Boeing Airplane Company, Wichita Division, Wichita, Kansas. Report No. 8820, Serial Numbers, 10/30/43, revised 10-1-62, p. 6.
4. *op.cit.*, Edward H. Phillips, *Stearman Aircraft*, p. 135.
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6. *Ibid.*
7. *op. cit.*, Edward H. Phillips, *Stearman Aircraft*, p. 135.
8. Walter D. House, "BMAC'S First Bomber," *BMC News & Views*, (December, 1980), Vol. 3, No. 4, p. 3.
9. *op. cit.*, Edward H. Phillips, *Stearman Aircraft*, p. 136.
10. *Pilot Flight Time Logbook*, No. 3, July 31, 1933 to April 10, 1940. David "Deed" Levy, Chief Experimental Test Pilot, Stearman Aircraft Company.



Left side view shows the conventional stepped cockpit design of the modified XA-21. (Stearman Aircraft Co. photo from the Kenneth D. Wilson collection)

11. *op. cit.*, Levy *Pilot Flight Time Logbook*.
12. Norm Avery, *North American Aircraft 1934-1998*, (Santa Ana, California: Narkie/Thompson, 1998), p. 62.
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15. *op. cit.*, Walter D. House, "BMAC'S First Bomber", p. 3.
16. David "Deed" Levy, note, undated, to Walter D. House.
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18. *op. cit.*, Edward H. Phillips, *Stearman Aircraft*, p. 136-137.
19. *op. cit.*, Levy *Pilot Flight Time Logbook*
20. USAAC Individual Military Airplane Record Card, XA-21, s/n 40-191, 1 September, 1939.
21. *op. cit.*, Levy *Pilot Flight Time Logbook*
22. *op. cit.*, Walter D. House, "BMAC'S First Bomber", p. 4.
23. *op. cit.*, USAAC Individual Aircraft Record Card.
24. *Ibid.*

About the Author

Tom Lowe is a retired United Airlines pilot and is shown here in the cockpit of his 1942 Stearman N2S-3, Bu Aer 07222, c/n 75-6826, N66417, which he has owned and flown for over 50 years. He is an active pilot and a flight instructor specializing in tailwheel airplanes in particular Stearmans and the North American AT-6. He currently owns three airplanes; a 1931 Stearman C-3R, a 1942 Stearman N2S-3 and a 1946 Aeronca 7DC Champion. He has had several other articles published previously in the *AAHS Journal* including "The Flying Aces Air Circus" which received both the Willis L. Nye Award and



Thomas Lowe

the Contributor's Award for 1977. Tom is the co-founder of the National Stearman Fly-In at Galesburg, Ill., and continues to serve as a director on the board of directors of the National Stearman Fly-In NFP, Inc. He also has served as a National Director of the Antique Airplane Association for many years. He and his wife, Nancy, reside in Crystal Lake, Illinois.

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