ROY REHM AND HIS RECREATED CLASSIC BOEING FIGHTERS

Roy Rehm, a native New Yorker who grew up in the town of South Westerlo near Albany had no particular involvement in aviation until his 6th grade school teacher Mr. Barrett brought his students into the "real world" by issuing model airplane kits to the boys in the class and dress patterns to the girls. Roy carried this early influence to California where he was to become an avid modeler, craftsman, carpenter, expert wood and metal worker while also earning his pilot's license.

Roy joined the world of aircraft construction by first building a home-built sport aircraft.

Like many of us "airplane nuts", he had fallen in love with the classic Pratt & Whitney Wasp powered Air Corps Boeing P-12 and Navy F4B fighters of the late 1920s and 1930s represented here by Pratt & Whitney's Boeing 100, (Army P-12 equivalent) WASP engine test airplane NX 872H in July of 1929.

Roy was among a number who dreamed of tackling the daunting task of building his very own Boeing fighter. Obtaining a nearly complete set of drawings from Boeing, Roy began serious pursuit of this dream when he managed to purchase an appropriate early Wasp engine and a pair of P-12 wheels. No stranger to the construction of early biplanes, Roy had earlier purchased a WW I Sopwith Pup project for restoration. He subsequently passed this project along to Frank Tallmann to complete for display in his Movie Land of the Air Museum at the southern California Orange County Airport. During the transfer process he received a personal tour of the museum conducted by Tallmann himself. On reaching the final aircraft on the tour, Tallmann confided to Roy: "If I were able to keep only one aircraft in my collection, it would be this Boeing 100."

"This Boeing 100" was NC 873H, the very aircraft used extensively by Frank Tallmann and his partner Paul Mantz in flying as "Tallmantz" for movie productions beginning in the mid-1930s. Mantz predeceased Frank and after Frank's death in 1978 the Boeing was obtained by Kermit Weeks' Fantasy of Flight Museum in Florida.

My November 1963 photo of the Tallmantz Boeing 100 at Orange County shows its then non-standard smaller Pratt & Whitney R 985 Wasp Jr. Engine, small low pressure tires, and oversized windshield.

Roy Rehm was fully aware of the complications to be faced in recreating an authentic P-12. Typical of these was the need to create the Boeing signature corrugated ailerons, elevators, horizontal and vertical stabilizers. These and other unique parts were going to require special tooling to build many components. The costs of creating these authentic parts for a single aircraft would be quite prohibitive.

When Hurricane Andrew struck Florida in 1992 Roy, like many of us, was horrified to learn that much of the Kermit Weeks' collection of aircraft in the Fantasy of Flight Museum had been destroyed. Among the destroyed aircraft was the Frank Tallmann Boeing 100 NC 873H.

"Roy was among a number who dreamed of tackling the daunting task of building his very own Boeing fighter."

Recognizing an opportunity to expand his building project, Roy contacted Kermit offering to rebuild the destroyed Boeing. He was advised that others had been there before him. Roy impressed Weeks with his enthusiasm and knowledge of Boeing structures when he visited to see the sad remains of the Boeing. He obviously had a realistic understanding of the scope of work required to rebuild the aircraft. Roy's proposal was accepted and, on March18, 1993, the remains of Kermit's poor Boeing arrived at the Rehm home in Gardnerville, Nevada. Roy was now thoroughly committed to this massive adventure.

The photo of the airplane's arrival in Gardnerville offers a hint of the challenges ahead.

Renowned Aviation Historian, Boeing Engineer and amateur aircraft designer/builder, the late Peter M. Bowers had written the definitive description of the building of Boeing fighters for the 18 June 1973 issue of Sport Aviation. The article titled "So you want to build a P-12" summarized the magnitude of the task facing anyone intending to do so. He warned that this ultimate example of the American biplane fighter was far more complex than any home built aircraft. It was also far more difficult than the well known WW II PT-13/PT-17 Stearman biplane primary trainers by then occasionally being converted to Pratt & Whitney power. The Boeing fighters were built for higher speeds and far more punishing maneuvers. They were stressed to withstand an astounding 12 Gs positive and 9 Gs negative.

Reading the Bowers article leaves the impression that he really did not expect anyone to successfully build an exact replica of the classic Boeing fighter.

Far from being deterred by the enormity of the job and understanding the massive effort and potential costs to be faced in duplicating the structural details of even a single Boeing, Roy Rehm expanded the project far beyond the restoration of the Kermit Weeks Boeing 100 and the single re-creation planned as his own. He challenged himself to build simultaneously eight brand new recreations of the Boeing 100/P-12/ F4B family.

While Bowers had predicted it would take 20 years for an individual to build a single Boeing. Roy was to bring the original Boeing to life and bring seven recreations to near completion within 23 years of effort.

The eight are: (1) The rebuilt Kermit Weeks Civil 100; (2) the recreated U.S. Army plain P-12; (3) the more advanced Army P-12B; (4 and 5) the two Navy F4B-1s. Following shortly will be (6) the Army P-12C/D; (7) the Navy F4B-2 and finally (8) the two-place Civil Boeing 100A as flown by Howard Hughes.

How has Roy accomplished this amazing feat?

The first step was to match the seven recreated models with buyers, the project to be funded by initial down payments followed by regularly scheduled progress payments. Buyers were found for six of the seven recreated aircraft.

Obviously this project was going to require the efforts of far more than a single individual. Roy had available family members, a number of talented local individuals, expert craftsmen, material and parts suppliers and specialized businesses necessary to recreate the Boeings.

Planning to utilize as much of Weeks' original NC 873H as possible, Roy identified the multitude of tasks, materials and thousands of parts down to the smallest detail necessary rebuild that and create seven new aircraft. He was going to require 8 complete sets of everything in order to create the finished aircraft. Roy planned to build them all simultaneously.

The project obviously would require eight correct model Pratt & Whitney Wasp engines of 420 to 550 horsepower. These were each to be zero-timed by Ken Miller's overhaul shop in Arkansas.

A list of specific original instruments needed for each Boeing type was compiled. All of these instruments have been acquired and almost all fully restored. The required engines and instruments were found through Trade-a-Plane and word of mouth.

Roy began construction by tackling the thousands of parts needed before assembly of major components such as fuselages and wings could be begun. These structures would be completed, all eight sets simultaneously. His approach was to set goals and consider creation of each set of parts as a finished product. The assembly of parts into a finished structure would constitute another goal. The completion of all eight sets another goal. Etc., etc., etc.

FUSELAGES

Bowers had pointed to Boeing's use of bolted aluminum tubing for the fuselage structure rather than the much simpler welded steel tubing as a one of the complications. Roy was able to obtain the square aluminum tubing of the correct specifications, some sizes from ALCOA, others from Plymouth Tube. He began the process by cutting the various lengths of tubing necessary and manufacturing the gussets and various parts needed for eight sets of fuselage. All aluminum components were etched, alodined, a protective chromate coating, inside and out, dipped in iron oxide primer then once assembled, painted with final aluminum coating.

Square tubing cut to lengths with necessary tooling to the left and an assortment of gusset plates, right.

Seven sets of Station 3 lower frames including wing mounts. Primed lower fuselage frames at right.

Seven new aft fuselage structures.

When all eight basic structures including their welded steel engine mounts were complete and primed, they were placed in the painting fixture right, to receive their final aluminum coating.

The classic Boeing bolted aluminum tube structure and gussets. The beautiful workmanship is evident.

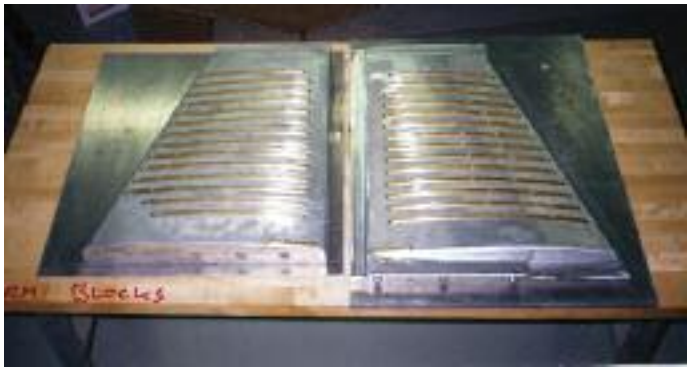
The fuselages required complicated secondary structure to support fabric covering, metal turtle deck and forward fuselage panels. It was reported by Pete Bowers that each fuselage structure alone had required 777 man-hours per aircraft by experienced Boeing airframe personnel during production.

WINGS

Bowers had warned that the wings could be expected to be equally difficult. The upper wing is a massive single piece structure spanning 30 feet, with a five foot chord, while the lower wing spanned 26 ft 4 inch with a 3 ft 9 inch chord. The wings were built up, each with two wooden Box spars with laminated wood tip bows. Each set of wings require 82 routed plywood main ribs with lightening holes cap strips and small stiffeners, with tiny metal fittings for attaching the thin wire which formed the trailing edges. Local friend Harold Buttles built up the spars and ribs while Roy's Son Luke assembled the eight complete sets.

To left are sets of wings, individual ribs and lower wing spars. Above, Boeing 100 upper wing with simple hinges, with below, Boeing P-12B and P-12C upper wings with offset hinges for Frieze Ailerons.

The "trademark" Boeing corrugated control surfaces had required male maple moulds with brass strips and female moulds to create the skins for these. Roy created machined aluminum male moulds over which aluminum skins were hydro-formed, heat treated and delivered by Gilmore Metal Works of Bishop California. Eight complete Sets of the corrugated skins were formed for required stabilizers and control surfaces. Internal structures for these were built on special fixtures created for the purpose.



Typical aluminum Form Blocks, left, and six Vertical Stabilizers assembled and primed, right.

Rudder substructure assembly fixture.

Riveting of the Rudders in progress.

Vintage Pratt & Whitney WASP Engines rebuilt by Ken Miller of Younkin Aviation, West Fork, Arkansas.

When enough major parts were complete, Kermit Weeks' Boeing 100 was set up for photos.

Creation of parts continued, including eight sets of Interplane Struts to left and Rudder Pedals at right.

Newer type fuel and oil tanks were created by Steve Loree of Loree Air in Placerville, California. To right, the oil and fuel tanks installed in the P-12B. Note the tubes through the oil tank for cooling air.

Army P-12 and P-12B, Navy F4B-1s and Kermit Weeks Boeing 100 Fuselages and sets of wings were returned fabric covered and painted by Rick Atkins of Ragtime Aero of Placerville, California.

Navy F4B-1s on left. On right, the Weeks' Boeing 100 is flanked by two Navy F4B-1s with WASP engines.

Four Wing Sets In climate controlled storage.

Army P-12 and P-12B with fuselages completed.

The Army P-12 represents Lt Elmendorf's 95th Pursuit Squadron #1 of 1929. The P-12B to right is Kelly Field #2 flown by my father Lt. C. I. Ferris of the 43rd School Squadron , Air Corps Advanced Flying School, 1932.

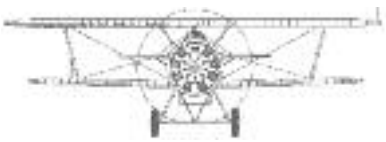
1929 version of the 95th Pursuit Squadron Insignia, left and that of the 43rd School (Pursuit) Squadron, right.

Close up of perfect F4B-1 #11 of VB-1 to left and F4B-1 #6 of VF-1 to right with Kermit's Boeing 100 beyond.

Kermit Weeks' Boeing 100 nears completion and will be the first to fly. This airplane was originally civil Boeing 100 number three retained by Boeing for a period as a demonstrator and for test work. It is painted now in its original Boeing paint scheme identical to Pratt & Whitney's NX 872H test airplane which was civil Boeing 100 number two. Photos show the superb job Roy has done rebuilding and bringing to life the new recreated Boeings.

All corrugated surfaces are complete including five of the sets of horizontal stabilizers and elevators which are being completed and installed today while the final three sets are still in process. These will be immediately followed by landing gear, brakes, installation of engines, engine accessories, pluming and controls. Five of the aircraft are nearing completion. It appears that there are about three more years of effort before the final three airframes will be ready for delivery.

Peggy and I are proud to have been able to help Roy with photos and occasional needed details we could provide over the years. We and have visited the Rehm family twice to view progress. Their operation is most impressive and as you can see here it is performed in a delightful period setting.



The Roy Rehm Boeing/Pratt & Whitney "Industrial Complex" located in Gardnerville, Nevada at the base of the eastern slope of the Sierra Nevada Mountains below Lake Tahoe.

It has certainly been a family affair. Wife Susan here displays the new Boeing 100 elevators to the left while son Luke and Roy himself pose with a buddy. Missing are the Rehm cats who form the rest of the team. We look forward to hearing that inertia starter and seeing those "wonderful P-12s" flying again!