For every aircraft conceived by Chance Vought and Vought engineers, there was that first "experimental" airplane. The idea behind each of these, known affectionately as the "X" airplanes, was to quickly build one aircraft and then test it to make sure everything worked well before committing it to a production run.

In the early days, of course, even the production models were largely hand-built. Today, we would call them "labor-intensive." Fabricating wooden frameworks and covering them with fabric, and then "doping" the fabric with multiple coats of lacquer required an immense amount of hand labor. It has been estimated that over 90 % of the weight of an airplane built in the early part of the 20th century consisted of wooden and fabric parts and finishing material such as lacquer! Only the engine and less than 10 % percent of the remainder of the airplane was metal.

During the thirties, aircraft engineers were beginning to employ increasing amounts of metal in the aircraft structure. Airplane fuselages were being made of welded steel tubing instead of wooden strips with wire braces, and metal spars in wings replaced wooden ones. Eventually, almost all of the aircraft frameworks were metal. During this decade, the development of "monocoque" structures permitted fuselages to consist of thin metal shells with a small number of bulkheads and frames, replacing both the old-style bridge-like frames and their fabric outer covering. Late in the decade, fabric-covered wings and tail surfaces would give way to all metal construction, including the skin. (Fabric-covered control surfaces survived into the next decade on military aircraft.)

During the fabrication and assembly of airplanes for a production run, mass-production techniques were employed to the maximum extent practicable. But building an "X" airplane was a totally different matter! For one thing, special tools were required when producing large quantities of production run parts, and special jigs and fixtures were needed for assembling these parts into the finished sub-assemblies and the final complete airplane. When a new "X" plane was needed, however, such special tools were bypassed, and everything was essentially hand built.

The "X" airplanes were built for the most part in a section of the Vought facility known as the experimental shop, or simply "Experimental." This department was equipped with the best available machines (for cutting metals and woods), a vast array of hand tools, and a collection of the finest mechanics, some of whom specialized in specific crafts. With a minimum of "special" tools (i.e., tools specifically designed for use on a particular aircraft), these craftsmen and women could fabricate "one-of-a-kind" parts in wood and metal and other materials for use on the "X" model of a new aircraft.

Perhaps the greatest skills in making the parts for an "X" airplane were demonstrated by the people who formed thin sheet metal into wing ribs, fuselage frames, engine cowlings, wing leading edges, wing and fuselage skins, and a variety of other parts that needed "three-dimensional" forming. Simpler thin sheet metal parts required only "two-dimensional work such as cutting to shape and bending along straight lines, but "three-dimensional" parts had bulges in them like footballs and balloons! All of the sheet metal parts on today's automobiles are "three dimensional", and are produced in quantity with huge stamping dies that convert flat sheet metal into the curved contours. Experimental mechanics could use special hammers and a sandbag or a hand-made form block to convert a flat piece of sheet metal into a gently rounded shape that in production would require several special tools to produce.

Upon completion of detail part fabrication and aircraft assembly, an "X" airplane would be subjected to a number of ground tests to make sure that the engine and various aircraft systems (fuel, oil, electrical, control, instruments, brakes) were functioning properly. When engineers, mechanics, and test pilots declared the new airplane ready, it would begin the test flight program. During this phase of the development of the airplane, pilots and engineers would evaluate how well the airplane met the

design requirements in terms of speed, climb rate, maximum altitude, range, maneuverability, and other performance characteristics. Often, during the flight test program, changes would be required. These would be designed, parts fabricated, and installed on the airplane as expeditiously as possible and flight tests would continue.

The "X" airplane concept permitted a way of quickly trying out a new or modified airplane design, to be followed, if successful, with large-scale production of the new aircraft.

Occasionally, a production airplane would be assigned the "X" airplane role, and modifications would be employed to use a larger engine, different wings or tail, bigger fuel tanks, or other suggested improvement. Whether created from “the ground up", as in the case of a brand new airplane totally different from its predecessors, or by modifications to an existing production model, almost every airplane in the history of the aircraft industry began as an "X" model

Airplane designations (those combinations of numbers and letters that precede the "familiar" name such as "Corsair" or "Kingfisher") always raise questions. But one of the least understood designations on Vought airplanes has been the "V" model.

Quite simply, the "V" airplanes have been the Vought demonstrators and export airplanes. "Export" meant those airplanes that Vought sold to foreign governments or customers, even civil agencies in the United States. In other words, "V" meant that the airplane *was not sold* to a military branch of the U. S. government. (The "X" designations on Vought airplanes were reserved for the experimental versions of airplanes intended for the U. S. military.)

One of the first “V” models in this decade was the V-50, built in 1931 as a demonstrator to promote export sales of the 03U. In 1933 and 1934, Vought built a large number of airplanes based on the SU-2. These were designated the V-65B, V-65C, V65CI, V65F, and were sold to Brazil, China, and Argentina, in both land and seaplane versions.

As you browse through this chapter you will encounter several “V” aircraft. As you read the details, you will note that often these export planes were sold without armament. In some cases, even the detailed specifications were different from the U. S. counterparts. (Check the throttle arrangement on the V156-F, developed originally for the French.)

All of the “V” aircraft , developed and manufactured for customers other than the U. S. military, represented a significant part of Chance Vought's efforts during this decade. Exploring the data and descriptions of how they differed from their U.S. military counterparts makes for interesting reading.