
The One and Only

FAIRCHILD XC-31 CARGO PLANE

by Kent A. Mitchell

All photos by Lyle S. Mitchell.

ONE OF A KIND, AND [ALMOST] completely forgotten, the Fairchild XC-31 was the *first* airplane specifically designed as a military cargo carrier. Erroneously, previous publications have given credit to the Curtiss C-76 *Caravan* for being "the first aircraft built by the U.S. to be designed from the outset as an Army cargo type."¹ (Five of that particular airplane were built in St. Louis during 1943 and 1944.²) However, Fairchild Aircraft of Hagerstown, Maryland, had built and flown an aircraft of such specifications in 1934.

Produced under contract for the U.S. Army Air Corps, the aircraft, first known as the Fairchild Model 95; was designed to be a strictly cargo/freight carrying vehicle. Built to meet or exceed Army specifications, the Fairchild ship became the largest single-engine cargo plane ever built. Redesignated as the

Army XC-31, a single Wright R-1820 *Cyclone* 9 reciprocating engine rated at 800 hp enabled the aircraft to carry two tons of payload at 150 mph for 750 miles. This plane thus transported freight at a ton-mile cost less than one-half that of the then-existing air transportation. Of conventional construction (of the time), the strut-braced, high-wing monoplane also could be outfitted as a hospital plane or a troop carrier for 15 soldiers. Outsized five-foot doors provided easy access to the 100 square feet of unobstructed floor space in the cargo compartment. The cargo deck was four feet above ground level, exactly matching the height of the Army truckbeds for easy loading.³

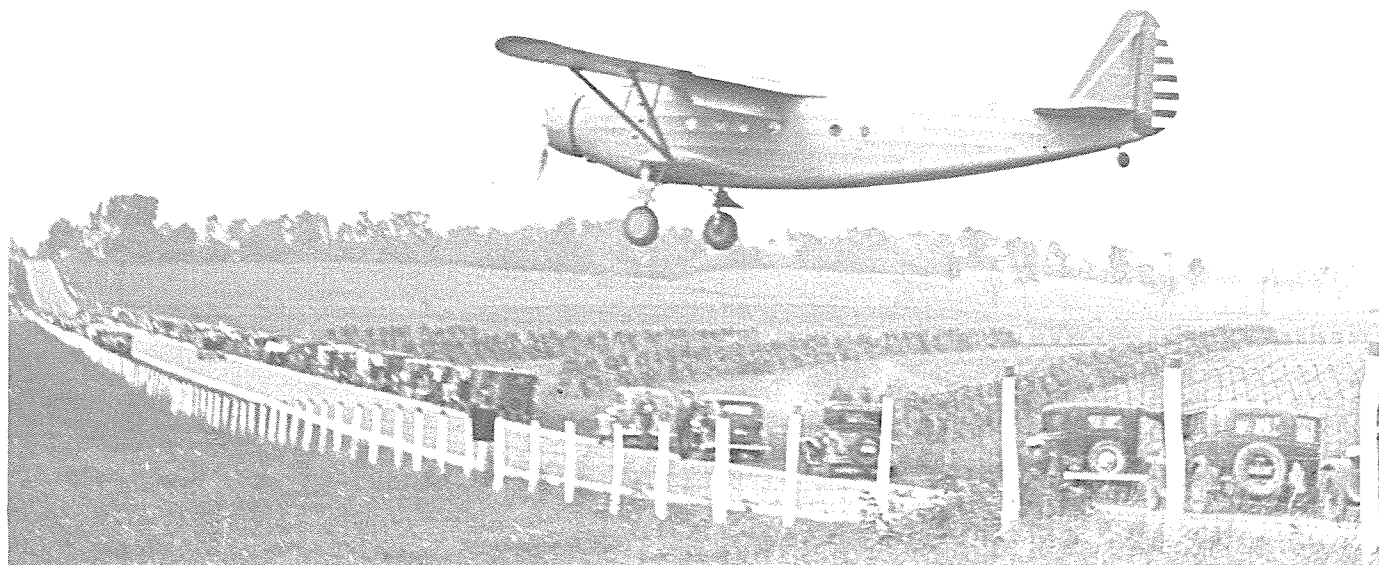
Credit for design of the airplane was given to A.A. "Al" Gassner.⁴

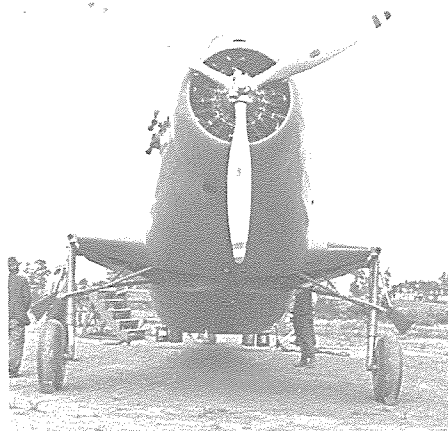
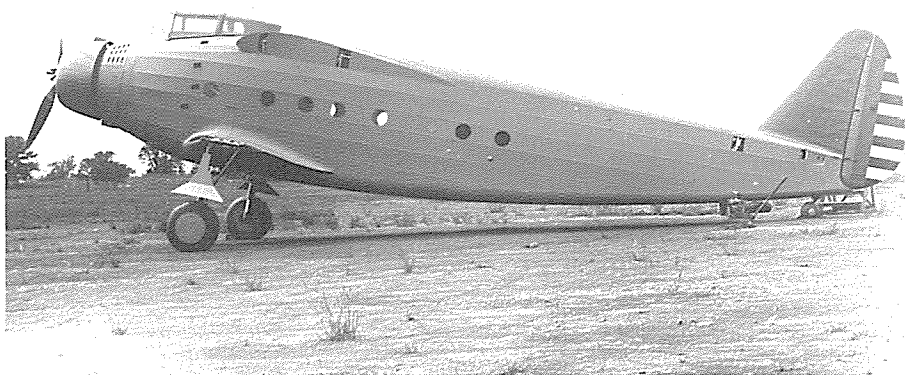
The rationale for the design of the XC-31 was somewhat interesting—remembering that this was the era of the

introduction of such planes as the Boeing 247 and Douglas DC-2.

At the time (then later—and as now), use of depreciated stripped-down passenger aircraft appeared at first consideration to offer possibilities as transports for freight and express cargoes. Analysis indicated, however, that "... in general the compromises initially made in the aircraft to take care of passenger transport mitigate against its efficient use for freight or express. The payload is generally low, the size of the loading doors too small, the floor strength and rigidity inadequate and the wing location generally interferes with the truck approach. Fuel and oil consumption, if the obsolete aircraft is multi-engine, is generally higher than can be justified for purely express or freight cargo

Across U.S. Route 11 and over the fence for first landing on the Hagerstown, Maryland airport grass.





transport.”⁵

Fairchild’s studies and analyses indicated that really low operational costs could be obtained only by use of specially designed cargo aircraft in which no design compromise had been made.

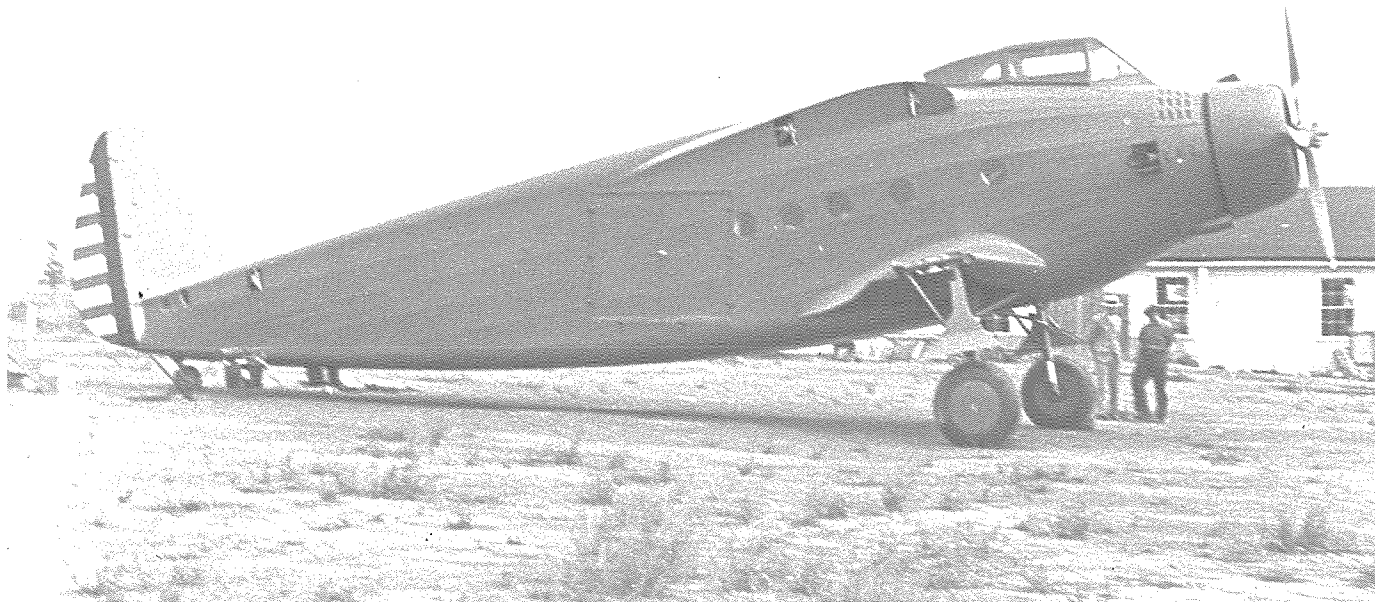
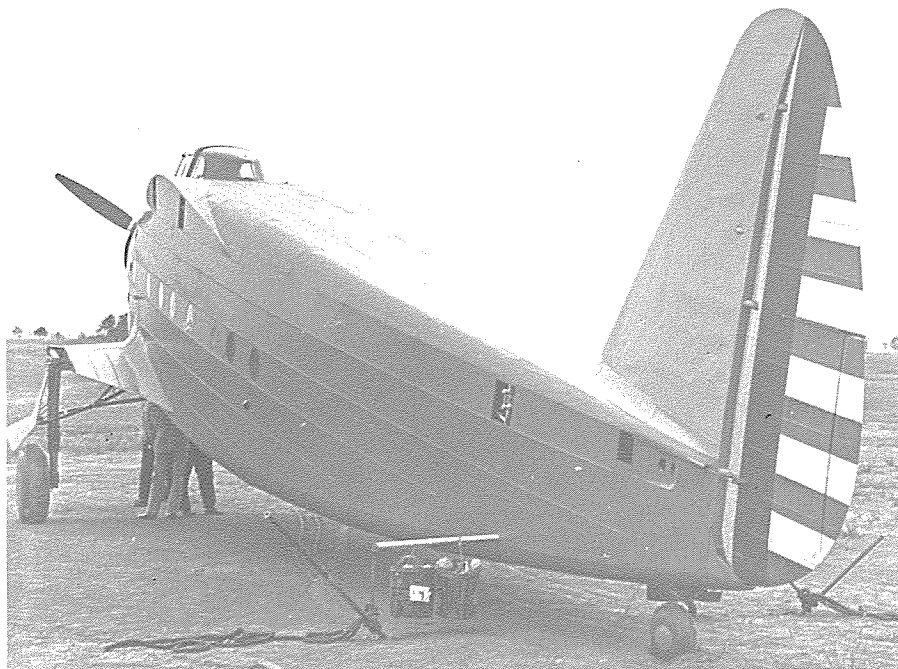
Speed was the first parameter to fall by the wayside as unnecessary for a cargo carrier. While important when hauling passengers, speed for hauling freight was sufficient if it only provided “next morning delivery halfway across the continent and a second morning deliv-

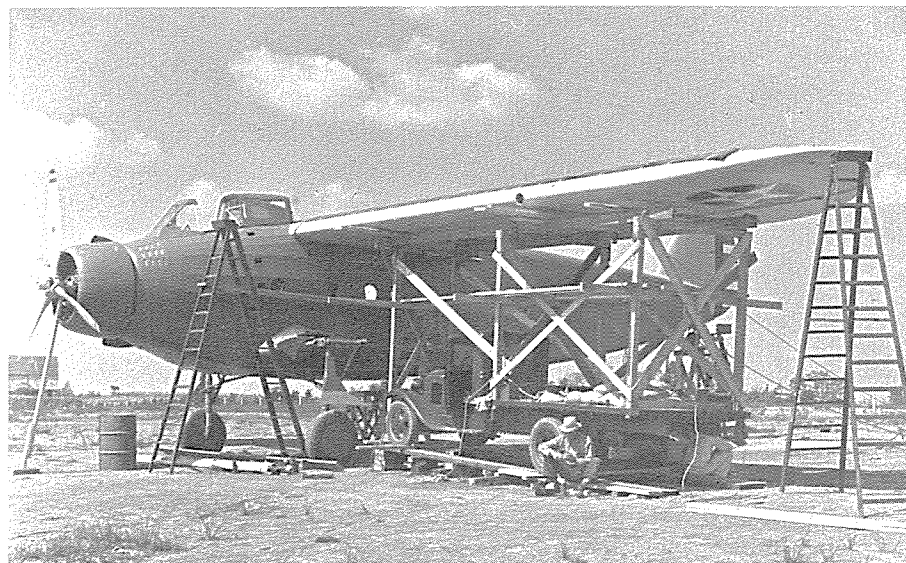
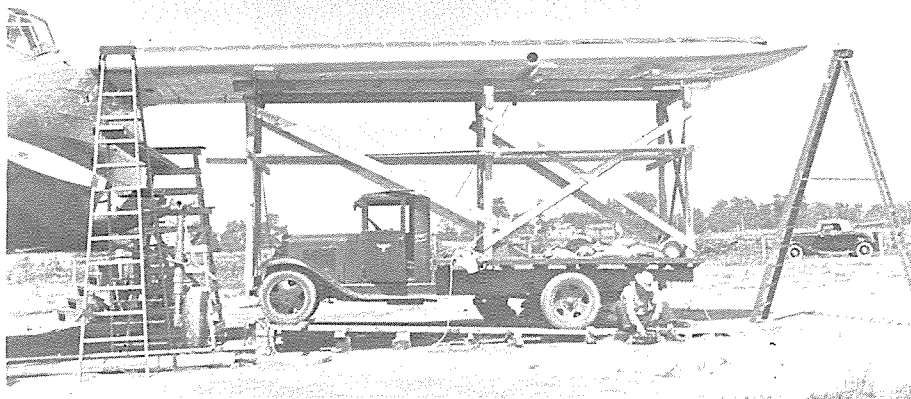
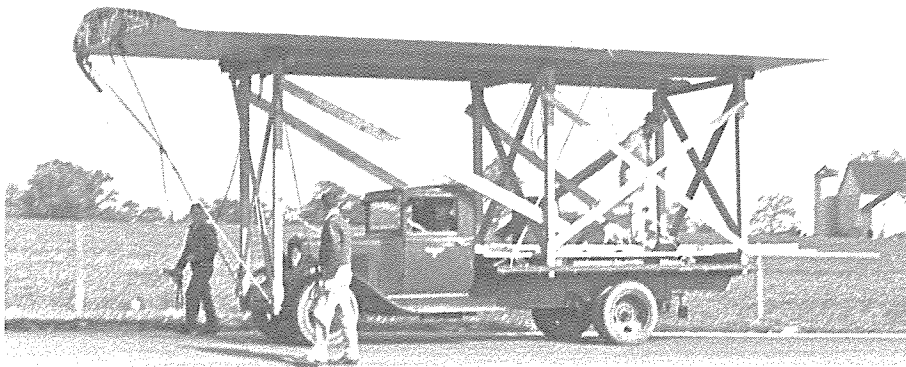
Completed fuselage was towed on U.S. Route 11 from Fairchild factory to the Hagerstown airport.

Front view showing details of retractable landing gear and R-1820 engine installation.

Rear view showing details of vertical fin and rudder. Note buckets of rocks to hold down tail.

Right-hand view of wingless fuselage showing orientation of cargo doors so as to be level in relation to the ground and at truckbed height.





ery across the entire continent." This implied a speed requirement of 120 to 140 mph.

Fairchild also reasoned that a single-engine aircraft was desirable for reasons of low maintenance cost, insurance, fuel, and depreciation charges.

"Consideration of constructional type involved a very considerable study, and the choice of a high-wing strut-braced monoplane in the race of the [then] current fashionable low-wing cantilever monoplane took considerable courage, but its choice was inevitable when the requirements were analyzed from a strictly cargo airplane standpoint.

"A cargo airplane will be loaded from ground trucks, hence unobstructed approach to the loading door is required. A cargo airplane should have an unobstructed cargo compartment of maximum dimensions and yet be of minimum cross-sectional area so as not to create excessive aerodynamic frontal area.

"A low-wing airplane would desirably have a cantilever wing construction, the spars and structure of which would necessarily be continuous through the cabin, seriously encroaching on the cargo volume or necessitating a higher fuselage and consequent greater frontal area. Likewise, a high-wing cantilever construction would intrude into the cargo compartment. Hence, the decision to strut-brace. While it is true that struts have drag, it is likewise true that cantilever wings . . . are necessarily thick. Owing to the practical equivalence in aerodynamic efficiency of the high-wing strut-braced, and the low-wing cantilever types, the determining factor in the final decision was that the strut-braced wings were less expensive to manufacture."⁶

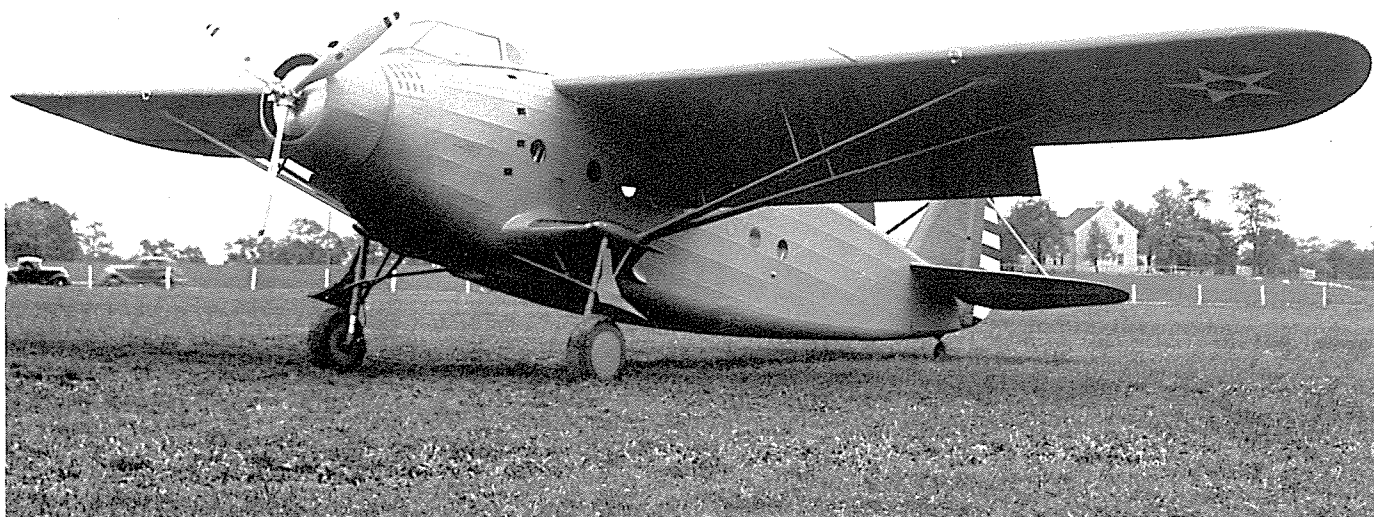
Similarly, consideration of a fabric-covered airplane versus the then-current trend to all-metal airplanes was based on cost. Total costs over the entire life of the airplane were analyzed. A fabric-covered airplane had a relatively lower initial cost due to the simplicity of

Right-hand wing arriving on truck from Hagerstown factory.

Ready to install R/H wing—crew learns truck rig is short in elevation!

Crew has constructed truck ramp to hang L/H wing.

XC-31 assembly has stopped for a crew lunch break.

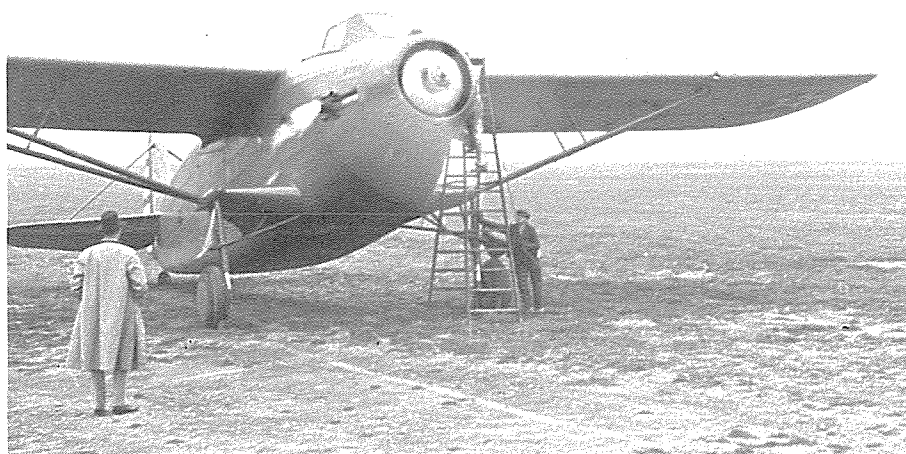


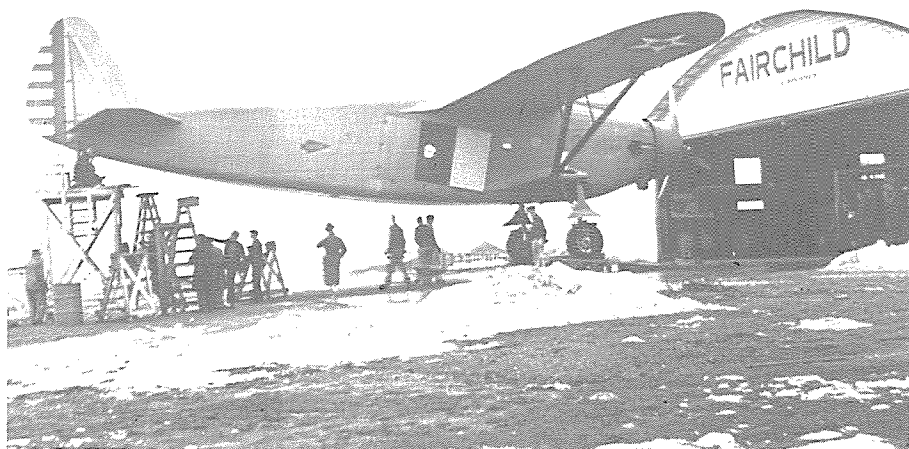
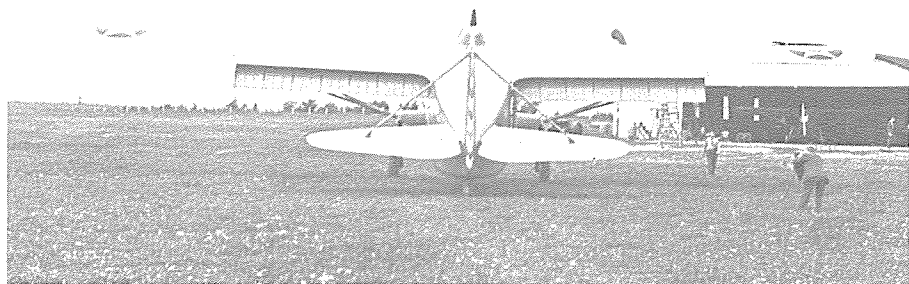
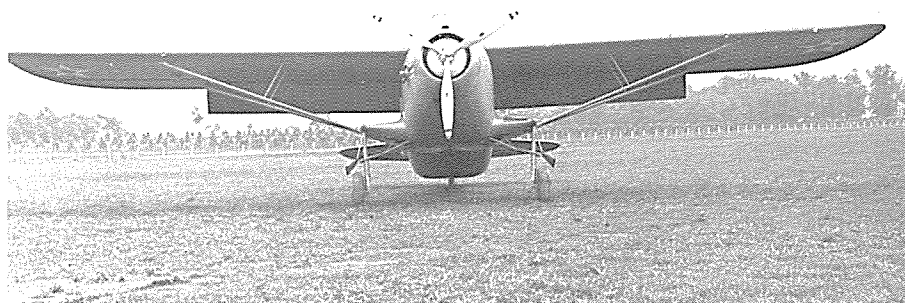
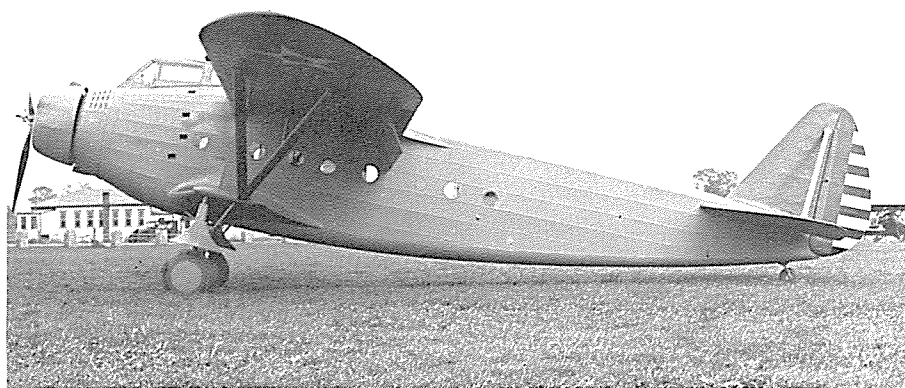
manufacture without the need of expensive tooling fixtures and assembly jigs. Then too, installation of fabric in the factory and repairs in the field could be accomplished by lower paid semi-skilled workmen. (The simple field repairs were also touted as desirable from a military standpoint.) The final argument for tube and fabric construction was that it allowed a cargo compartment

The 1934 Fairchild XC-31, largest single-engine cargo plane ever built.

Three-quarter rear view of the XC-31 showing the split trailing edge flap.

First engine run. Note "rich mixture" flame from exhaust.





with a rectangular cross-section and a large cargo loading door—whereas a metal monocoque fuselage is necessarily oval or round by design and a large side-loading door is a problem.

One very unusual design feature of this strut-braced, high-wing, fabric-covered and slow airplane—it had retractable landing gear! When all other design parameters were based on economical and low maintenance costs, no explanation was given for this deviation from the chosen design philosophy.

The Army gave Fairchild the go-ahead to build a single prototype and work began in 1934. As with all of Fairchild's Hagerstown-built airplanes of the period, manufacturing was done at its in-town Pennsylvania Avenue factory, the completed fuselage towed and the wings trucked several miles north on U.S. Route 11, with final assembly and flight test at the Hagerstown airport.

The first flight of the XC-31 occurred in the evening calm of September 22, 1934, piloted by W.N. DeWald, "World War flier and test pilot extraordinary."

The local newspaper reported:

The largest single-motor plane ever built took to the air this afternoon and made a successful 20-minute maiden flight.

Pilot DeWald, Baltimore, brought the plane down to a perfect landing just before nightfall after circling the field at an altitude of about 1,000 feet.

The plane was built by the Kreider-Reisner Aircraft Corporation, a subsidiary of the Fairchild Corporation, for the United States Army. It is reported that the plane under full load weighs 6½ tons.⁷

After several months of test and demonstration flights, the completed aircraft was delivered to Wright Field, Ohio, for test and evaluation by the Army. No subsequent orders for production of C-31 aircraft were received by

Side view shows chord of wing. Note pilot's cockpit external entrance footholds in side of fuselage.

Front view showing the flaps and installation of a baffle to direct cooling air to the nine cylinders of the Wright Cyclone engine.

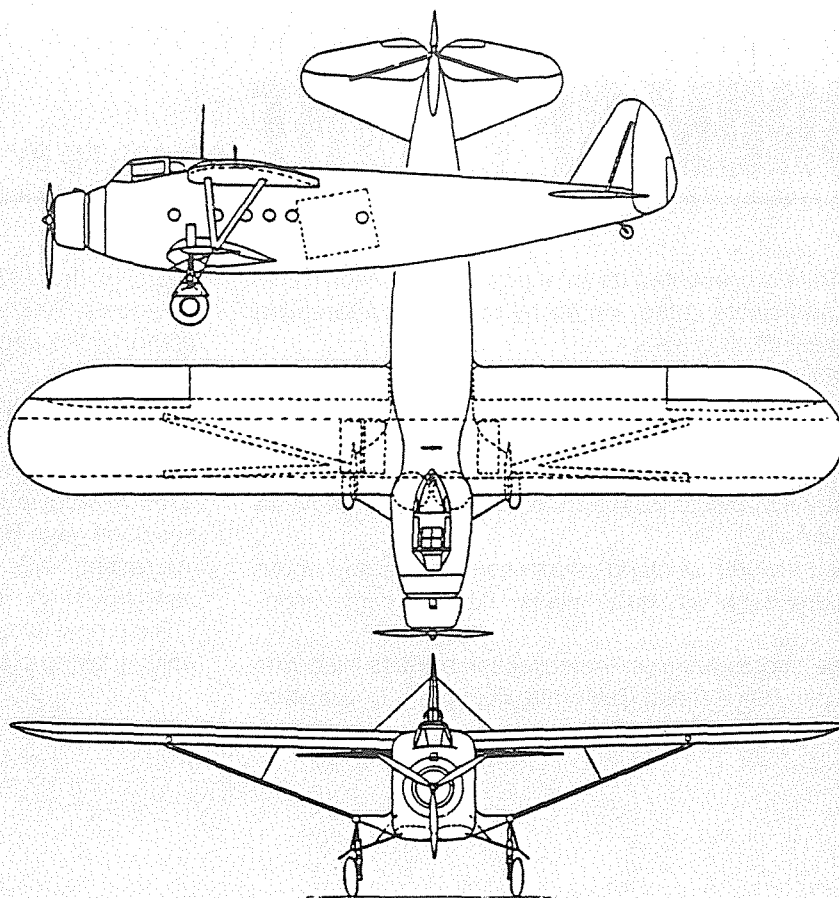
Rear view showing the long span of the flaps.

Weighing the aircraft on the then snow-covered airport prior to delivery to the Army. The XC-31 was too large to fit into the company's hangar. Note that the hangar has both Fairchild and Kreider-Reisner logos.

FAIRCHILD XC-31

XC-31 TECHNICAL DATA

Type:	General purpose military transport
Crew:	Pilot only
Powerplant:	One Wright Cyclone Model R 1820-25, 750 horsepower
Span:	84 feet
Length:	55 feet
Height:	15 feet 10 inches
Weights:	Gross — 13,000 pounds Empty — 8,300 pounds
Payload:	4,700 pounds
Cruise Speed:	147 miles per hour
Max Speed:	162 miles per hour
Service Ceiling:	16,150 feet
Range:	810 miles
Initial Climb:	720 feet per minute
Landing Distance:	120 feet (50 ft obstacle, 60° flaps)
Landing Speed:	60 miles per hour



Fairchild. However, some of Fairchild's design rationale—such as truckbed height cargo loading doors and high-wing configuration—did reappear some 10 years later with their C-82 *Packet*, the "Flying Boxcar." □

REFERENCES

1. Francis J. Caffrey, "Extraordinary Extroverts," *Air Progress* magazine, 1957/1958 Edition, Street & Smith Publications, Inc., New York, NY, pp. 63, 64.
2. Frederick W. Roos, "Curtiss-Wright, St. Louis," *AAHS Journal*, Vol. 35, No. 4, Winter 1990, p. 304.
3. *Yesterday—Today—Tomorrow, Fifty Years of Fairchild Aviation*, Fairchild Hiller Corp., 1970, p. 27.
4. "Jottings from Yesteryears—40 Years Ago," *The Daily Mail* newspaper, Hagerstown, Md., Sep. 23, 1974.

5. Author unknown, "Air Freight Now Practical with New Cargo Plane Operating at Low/Mile Cost," *Fairchild Aviation News*, Fairchild Aviation Corporation, Woodside, NY, No. 5, May 1936, pp. 2, 3, 6.
6. *Ibid.*
7. "Giant Plane Up for Test Flight," *The Daily Mail* newspaper, Hagerstown, Md., Sep. 23, 1934.
8. Detail Requirements, Fairchild Aircraft Corp. XC-31 Specification No. 481, p. 4.

Looking forward inside cargo compartment.



Looking up into pilot's cockpit through door in forward cargo compartment bulkhead.

