

WARPLANE
Plus
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**THE COMPLETE HISTORY OF THE NORTHROP ATTACK PLANES
AND ITS EXPORT DERIVATIVES**

**BY SANTIAGO RIVAS, AMARU TINCOPA, NICO BRAAS
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JACK NORTHROP'S EARLY AIRCRAFT

ABOUT ALPHA, BETA, GAMMA AND DELTA

By Nico Braas

Aircraft constructor and manufacturer Jack Northrop is well known for his flying wing designs. Lesser known is the story of his earlier designs.

Born as John Knudsen Northrop on 10 November 1895 he started his aviation career in 1916 at Loughhead Aircraft Manufacturing. When this company folded, he joined the Douglas Aircraft Company as a project engineer where he worked together with Douglas designer Edward Heinemann. Northrop had always been interested in building light weight monocoque fuselages and in his free hours he designed his

very first aircraft. He left Douglas and re-joined the newly formed Lockheed Aircraft Company. Here, his design would materialise as the Lockheed Vega. After a short spell at Lockheed, he left again. He started his own company in 1929; the Avion Corporation. He sold this company two years later and in 1932 he established a company under his own name: the Northrop Corporation. It was a joint-venture with Donald Douglas with its main production facilities at El Segundo, California. Here, he started with the design and construction of a small range of modern looking and for that

time very revolutionary monoplanes for civil and military use as the Alpha, Beta, Gamma and Delta.

NORTHROP ALPHA

The first type built at the El Segundo plant was a very modern all-metal low-wing monoplane known as the 'Alpha'.

It was powered by a single 420 hp Pratt & Whitney Wasp air-cooled radial engine. It had, directly after the engine firewall, a fully enclosed cabin with capacity for six passengers.

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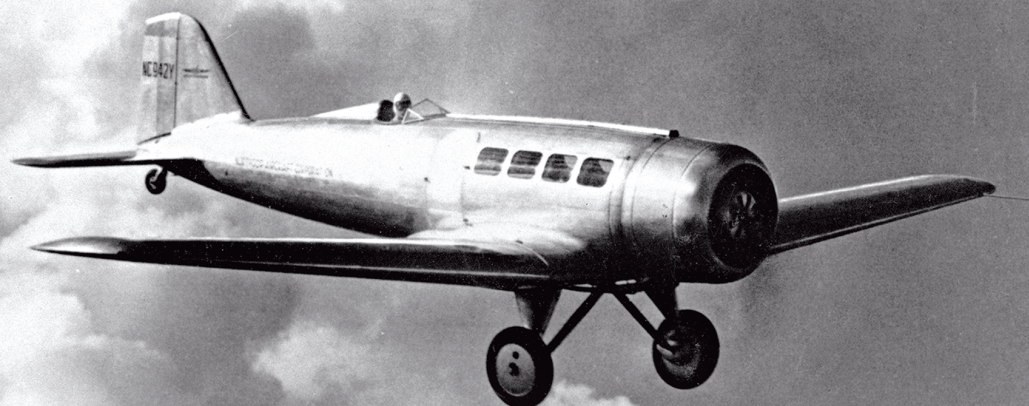
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Alpha 2 NC999Y was the third machine delivered to TWA. (coll. N. Braas)

Based on the latest wind tunnel findings and latest 'state of art' of aeronautical engineering it featured an aluminium monocoque fuselage and an all-metal, unbraced 'stressed-skin' wing with a de-icing device on the wing leading edge. The main wheels of the undercarriage were uncovered, but later types had slim trouser-type wheel-spats. In spite of its for that time very modern construction, the cockpit was still open with only a small front screen.

The first flight of the prototype with registration X-2W took place in early 1930 with test pilot Eddy Allen at the controls. Unfortunately, it already crashed on its second flight when it lost an aileron. The first Alpha 2 carried the registration X127W. In spite of this five were ordered and put into service as Alpha 2 at Transcontinental & Western Air or TWA. Later, this company became well-known as Trans World Airlines! In total, TWA used thirteen Alpha's on its regular flying routes from San Francisco to New York until phased out in 1935. With a total of 13 intermediate stops it could make this flight in just 23 hours. Some Alpha 2s were converted into



The second built Alpha 2. (coll. N. Braas)

a two-seat version with some cargo capacity for freight and airmail as Alpha 3. A further conversion for freight only was the Alpha 4 with a slightly larger wing and streamlined main wheel covers.

One Alpha, NC999Y was used by the NACA flight test centre at Langley.

One Alpha carried the registration NR11Y as a racing plane and it flew not only with a wheel based undercarriage but also on floats. It seems this registration never was official (in fact it was NC11Y) and it never entered any racing contest. NR11Y still exists at the National Air & Space Museum.

*The US Army Air Corp Y1C-19 with serial 31-518.
(coll. N. Braas)*



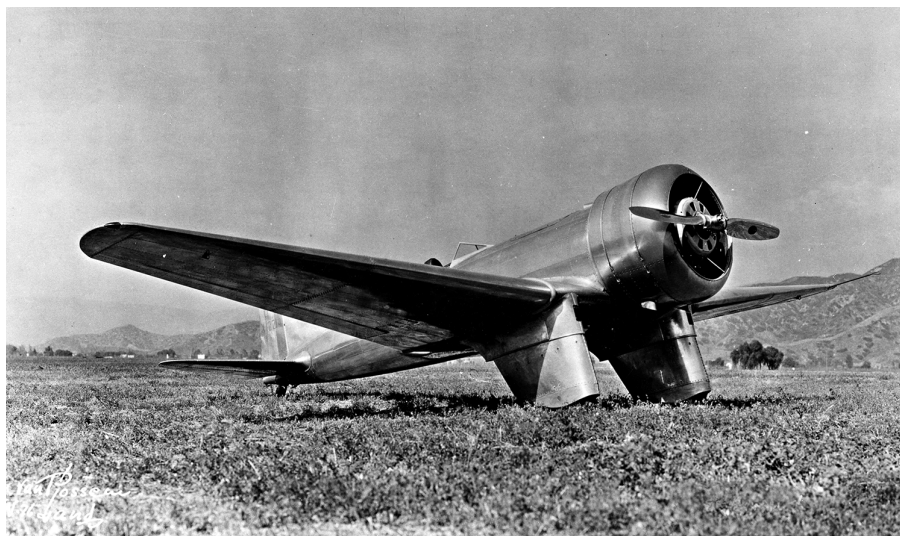
The Army Air Force used one Alpha 1 as the YC-19 and two as Y1C-19 for military VIP transport, with the passenger capacity reduced to four. Their serial numbers were 31-316, -317 and -318. The first YC-19 was delivered in May 1931, and used as a fast staff transport primarily for Army Generals and Washington, D.C. and VIPs (i.e. politicians). From the summer of 1931 until the spring of 1933, the C-19s, based at Wright and Bolling Fields, shuttled VIPs to various locations around the country. Y1C-19 31-318 was destroyed on March 20, 1933 in a fatal crash, the remaining planes were removed from VIP service and sent to regular Air Corps units for use as squadron 'hacks', light cargo and military passenger transports. The remaining two C-19s were kept in service until mid-1939 when both planes were sent to aircraft mechanic schools and used as ground trainers. Total number of Alpha's built was 17.

*The second, still unmarked, Northrop Beta.
(coll. N. Braas)*

NORTHROP BETA

Roughly based on the earlier Alpha, Northrop designed and built a smaller all-metal aircraft as the 'Beta.' Responsible for its design was Don Berlin (who later became chief designer at Curtiss). The Beta c/n 1 was a low wing monoplane of all-metal construction with two separate

cockpits and well-streamlined trouser fairings around its main wheels. For its time it was a very advanced construction fitted with a 160 hp Menasco Buccaneer inline air-cooled engine. The first flight was made on 3 March 1931. Initially it carried the civil registration X963Y (later NX963Y) but when it received its full Certificate of Airworthiness this was changed into

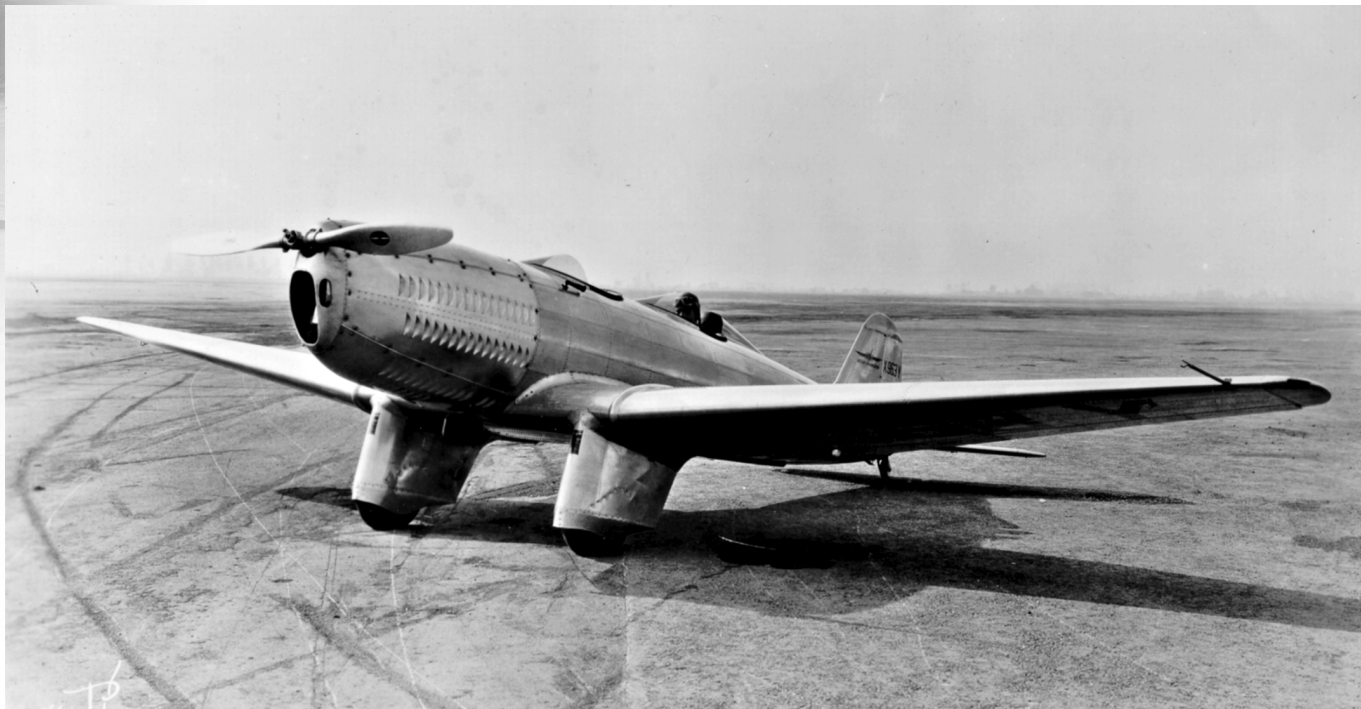


NC963Y. It did not last very long; on 12 August 1931 it crashed at Los Angeles.

At Northrop a second Beta c/n 2 was built that was quite different from the first one. The second cockpit was deleted and as a single-seater it was fitted with a much more powerful engine: a 300 hp Pratt & Whitney Wasp Jr. radial air-cooled engine. Carrying the registration X12214 (later changed into N12214) it could reach a speed in excess of 322 km/h (200 mph).

Stearman was at that time Northrop's sister company based at Wichita and here it was used as a demonstrator for possible clients. Because of the economical crisis at that time not a single one was ordered and N12214 was finally sold to a wealthy private pilot. However, during its delivery to New York it made an intermediate landing at Wright Field where it was thoroughly tested by the Army Air Corps since at that time the A.A.C. still used biplanes! It was rarely flown by its new owner and in 1932

the plane changed hands again to a new owner who based it at Roosevelt Field. It was damaged later at a nearby airfield. It was repaired and used by Stearman at Wichita as an experimental test platform for various flap designs until it crashed on 5 May 1934 due to a structural failure of a wing.



The Beta, designed as two seat sports plane.

(coll. N. Braas)

The Beta, with X-registry. The Stearman company would dub it Model 3D.

(coll. N. Braas)

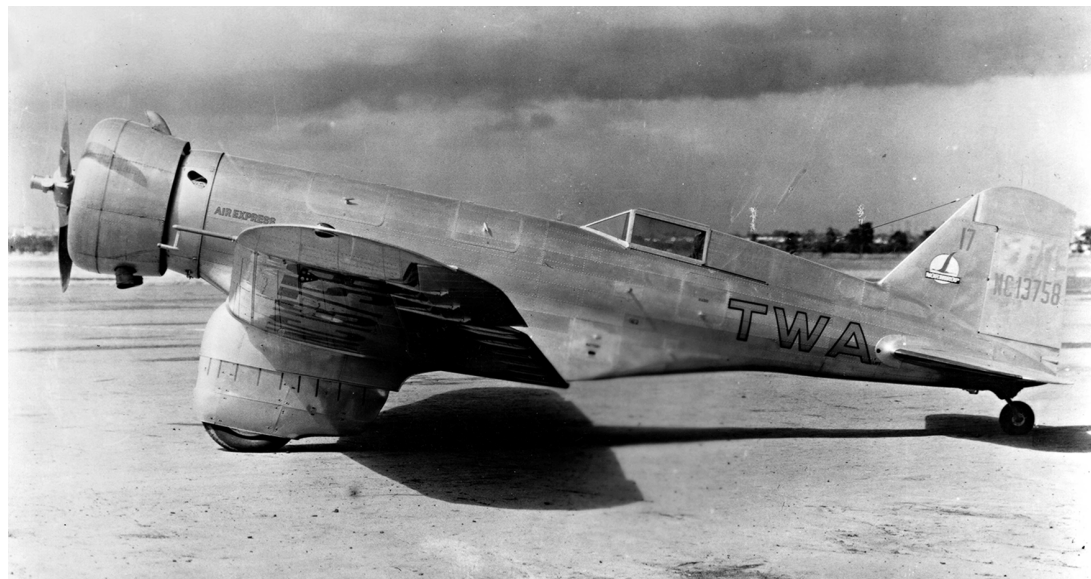
NORTHROP GAMMA

Early 1932 Northrop started with their next type in the Greek alphabet: the Gamma. It was a high-performance aircraft built according to the latest techniques i.e. all metal, unbraced sleek monoplane with a monocoque fuselage and stressed-skin wings. It was intended as a fast mail carrier, but the performances were so high that it was also used for racing and long-distance flights. It featured the same type of fixed undercarriage as the Alpha with well-streamlined trouser-type fairings. It also featured a fully enclosed two-seat cockpit.

Power was provided by a 785 hp Wright Whirlwind radial engine. What Jack Northrop also had in mind was that it could easily be developed further for military use. Built at Northrop's new Mines Field production facility, the first Gamma was designated as the Gamma 2A with registration *X12265*. Later this was changed into *NR12265*. It was built as a single seater, owned by Texas Oil Company (Texaco) and flown by the famous pilot Frank Hawks in some record breaking flights. Named *Sky Chief* it made on 2 June 1933 a non-stop flight from Los Angeles to

New York in 13 hours 27 minutes with an average speed of 291 km/h. In 1934, it was entered in the Bendix Trophy Race but it crashed after an in-flight fire had broken out.

The second Gamma (the 2B) was also purely intended for record breaking flights. Carrying the registration *NR12269* it was built as a two-seater for Lincoln Ellsworth. It was named *Polar Star* and fitted with a 500 hp Pratt & Whitney Wasp. It could be fitted with the streamlined wheels undercarriage and with twin floats made by Edo.



TWA purchased three Gamma's, known as 2D.
(coll. N. Braas)



If needed the wheels could be replaced by skis. Purpose of this special built version was to make flights across the Antarctic continent. After two failed expeditions in 1934 and early 1935, a third attempt was made in November 1935. It ended after some thousands kilometres on Antarctica with an emergency landing without fuel. Ellsworth and his plane were picked up by a British ship. *Polar Star* eventually ended in the collection of the National Air and Space Museum.

A further three Gamma's (c/n nos. 8-10) were ordered by TWA as Gamma 2D. They carried the civil registrations X/NR13757,

Jacqueline Cochrane for her entry in the McRobertson Race from the U.K. to Australia in October 1934. The plane was already damaged during its delivery flight and Jacqueline Cochrane eventually entered the McRobertson Race with a two-seat Gee Bee racer (without success since she had to give up at Budapest!). NC13671 was later rebuilt and fitted with a Pratt & Whitney radial engine for the Bendix Trophy Race in 1935. The plane had to give up this prestigious race because of deteriorating weather conditions. Re-engined with a 1000 hp Wright SR-1820-G2 radial engine it was leased to Howard Hughes. He set a new transcontinental non-stop record with this aircraft by covering Burbank to

named Delta, a single 710 hp Wright SR-1820 engine. It had accommodation for six passengers. First flight with c/n 3 X/NC12292 was made in May 1933. It was lost in a crash in October 1933 after it had been damaged at an earlier landing incident. The next Delta was powered by a 660 hp Pratt and Whitney Hornet engine. Unfortunately for Northrop a restriction was put on single engine aircraft used for passenger operations at night and over difficult terrain. For this reason only a small number was built that saw mostly use as executive transport in (wealthy) private hands. Most Delta's were powered again by the more powerful SR-1820 engine, but a few received also the P&W Hornet.



Jacqueline Cochrane's
streamlined Gamma 2G.
(coll. N. Braas)

X/NR13758 and NC13759. They were purchased and delivered in 1934 as fast mail planes with capacity of 633 kg in two fuselage cargo holds. The first TWA Gamma 2D was used for record breaking transcontinental flights as NC13757. With this aircraft TWA pilot Jack Fry established a transcontinental one-stop record on 13-14 May 1934, by covering Los Angeles-Kansas City- Newark in 11 hr 31 min with a 152 kg payload of special mail. Another TWA Gamma 2D, X13758, was later used for high-altitude flight testing as NR13758.

Gamma c/n 10 was purchased by Texaco for promotional flights in 1935. It ended its day as a bomber during the Spanish Civil War.

Gamma 2G c/n 11 X13671/NC13761 was fitted with a 700 hp Curtiss Conqueror liquid-cooled engine ordered by

Newark in 9 hr 26 min at an average speed of 417 km/h.

Gamma 2H c/n 12 X2111/NR2111 was used for racing purposes by respectively Marion Guggenheim, Russel Thaw and Bernard McFadden.

NORTHROP DELTA

In August 1932, when the first Gamma was completed, Northrop developed in parallel a larger type which better suited the needs of the airline companies. Northrop selected for his new all-metal airliner,

One Delta (c/n 29) was quite different in appearance fitted with a rearward placed Gamma cockpit. It flew at the Swedish company AB Aerotransport with registration SE-ADW carrying the name Smålland. AB Aerotransport also operated a second standard Delta (c/n 7) with registration SE-ADI named Halland.

Two Delta's were used in the Spanish Civil War by the Nationalists carrying the registrations 43-4 and 43-5. as light transport planes.

One Delta, c/n 74, was used by the U.S. Coast Guard as RT-1 with registration V150.

Technical data				
	Alpha 2	Beta 2	Gamma 2D	Delta 1B
Engine	P&W Wasp	P&W Wasp Jr	Wright SR-1820	P & W Hornet
Power	420 hp	300 hp	710 hp	660 hp
Wingspan	12.8 m	9,75 m	14.57 m	14.55 m
Length	8.7 m	6,6 m	9.50 m	10.44 m
Height	2.7 m		2.74 m	2.95 m
Empty weight	1177 kg		1868 kg	1860 kg
All-up weight	2045 kg		3334 kg	3175 kg
Max. speed	285 km/h	341 km/h	359 km/h	338 km/h
Range	2650 km		3170 km	2495 km
Service ceiling	5885 m		7130 m	6095 m
Accommodation:	1 + 6	pilot only	1 or 2	1 + 6

A MILITARY GAMMA FAMILY

Construction of the third Gamma (c/n 5) started as private venture and was completed in May 1933 as Gamma 2C. It was sent to the Army Air Corps for evaluation at Wright Field. The plane was armed with four fixed machineguns in the wings plus a fifth trainable example in the observers' cockpit. An 1100 lbs bombload could be carried externally. Power was provided by a 735 hp Wright SR-1820-F2 radial engine. It carried the civil registration X12291, and flew for the first time during spring of 1933. During the following period, it was thoroughly tested by the Army Air Corps before returning to Northrop for modification work in February 1934. The tail planes were replaced by slightly larger, more triangular shaped examples. The plane re-

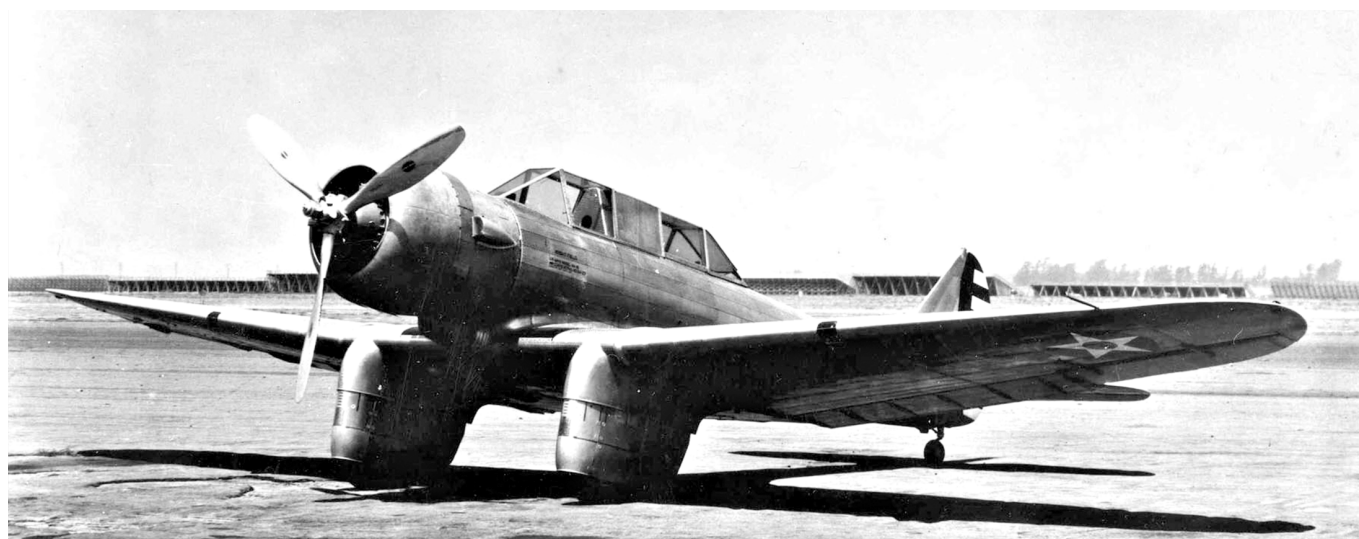
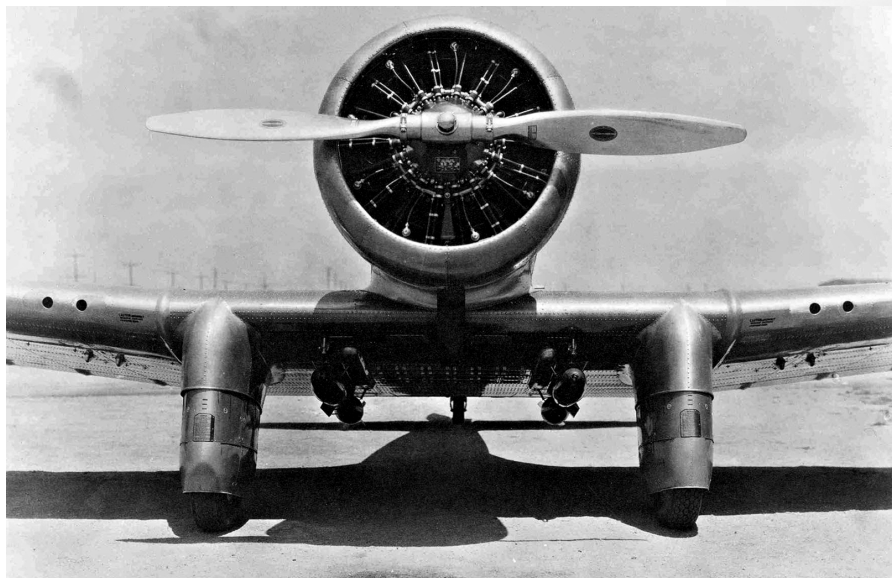
The last Delta built, c/n 185 was shipped to Canada as a pattern aircraft for licence production.

Total number of Delta's built was 13 with another 19 built under a licence by Canadian Vickers for use by the Royal Canadian Air Force. Canadian Delta's were sometimes fitted with snow skids and at least one was fitted with floats.

Right: An impressive front view of the YA-13, showing its thick wing and massive engine which was much wider than the fuselage.

(coll. N. Braas)

The YA-16 with its smaller diameter 14 cylinder Pratt & Whitney R-1830-7 engine. (coll. N. Braas)



ceived the new military designation YA-13 and was purchased on 28 June of the same year, at a cost of \$ 80,950, receiving military serial 34-027.



It was found that the large diameter engine interfered with forward vision and the plane, after logging 22 flying hours, was again returned to the Northrop factory in January 1935 for modifications. The engine was replaced by a Pratt & Whitney R-1830-7 Twin Wasp of 950 hp of smaller diameter. The machine re-emerged with the new Army Air Corps type designation XA-16 and was sent back to Wright Field for further evaluation on 18 April 1935.

After initial testing, the new engine proved to be too powerful, and further refinements were needed. The XA-16 program was ended after its testing period was completed, having accumulated 732 flight hours. It ended up as instructional airframe at an aircraft mechanics' school at Roosevelt Field, Long Island.

NAVY PROJECTS

Parallel to the Army Air Corps projects, a line of navalized planes took shape. C/N 6 was a single seat shipboard fighter designated as XFT-1. In fact, it was only roughly based on the Gamma. It was powered by a Wright R-1510-26 air-cooled radial engine of 625 hp, received U.S. Navy BuNo. 9400 and was delivered to Anacostia Naval Air Station on 14 February 1934. It was rejected by the Navy, even after it had

The XFT-2 was Northrops second attempt to develop a naval fighter. After its crash, the project was shelved. (coll. N. Braas)

been fitted with a more powerful 700 hp R-1535 engine and redesignated as XFT-2. Flight characteristics were still unacceptable and the XFT-2 was returned to the factory. During its return flight it crashed over the Allegheny Mountains, and further developments were terminated.

EXPORT TO CHINA

Construction nos. 14-27, 30-37 and 45, 46 were Gamma's 2E ordered by the Chinese government. The series production was a welcome source of income for the compa-

ny. They were fitted with military equipment including a flexible machine gun in the rear cockpit and four fixed machine guns in the wings. They could be used for armed reconnaissance and as light bomber. They were powered by a 710 hp Wright SR-1820-F3 driving two-blade propellers. Total supply was 24 aircraft. All were delivered between February and December 1934. Another 25 (c/n 48-72) were delivered as components for local assembly in China by the Central Aircraft Manufacturing Company (CAMCO).



An unmarked Gamma 2E, the prototype of a series intended for China. (coll. N. Braas)

During their operational use, the aircraft still left after numerous training accidents were destroyed during the early phase of the military conflicts with Japan.

A single Gamma 2E was purchased by the British Air Ministry for evaluation at Martlesham Heath test centre. C/n 13 received R.A.F. colors and serial K5053. Conclusion here was that 'performance was not outstanding' and after some use as a general purpose aircraft it quietly disappeared and its final fate is unknown.

to replace the dive brakes with new units which were perforated. This indeed solved the buffeting problems. The prototype was accepted on 12 December and an order for 54 production BT-1s powered by a 825 hp P & W R-1535-94 radial engine was placed in September 1936.

Gamma c/n 47 was designated as Gamma 2ED-C. It was powered by a 735 hp Wright SR-1820-F53 engine. It was completed in 1934 as a demonstration aircraft with civil registration X13670. During 1935 it made an extensive demonstration tour in Central and South America, flown by Frank

Hawks and G.H. Irving. Total flying time was 101.23 hours at an average speed of some 320 km/h. It was flown back to Los Angeles in May 1935 and was finally sold to the Soviet Union in November 1935.



NAVY DIVE BOMBER

Another offspring of the Gamma line was a light naval bomber and attack plane. It was designed in response to a specification drawn up in June 1934. The Northrop project received preference by the US Navy and Northrop was awarded a contract for a single prototype under designation XBT-1 in November 1934. Technically, it was a scaled down, refined and strengthened model 2C. It featured main landing gear legs that retracted backwards in two streamlined underwing fairings. The wheels were only partly retracted for making emergency landings with minimal damage. Further, the BT-1 was fitted with an arrestor hook for operations from aircraft carriers. The prototype (C/n 43, BuNo. 9745) made its first flight on 19 August 1935. After initial flight testing severe buffeting was experienced during test dives. To cure this, NACA recommended

The single Gamma 2E delivered to Great Britain. (coll. N. Braas)



A BT-1 at El Segundo. The revised XBT-2 variant was to be the forerunner of the famous Dauntless divebomber. (coll. N. Braas)

Naval squadrons

The BT-1s were assigned to naval squadrons VB-5 (operational on USS Yorktown) and VB-6 (on USS Enterprise) and were used until 1941. A further development was the BT-2 with a fully revised fuselage and a 1000 hp Wright R-1820-G133 engine and an undercarriage that was fully retractable in the wings. First flight of the XBT-2, still fitted with a 825 hp P & W R-1535 engine, took place in April 1938. The U.S. Navy was very impressed with the performances of the BT-2 and soon an order followed. The first five were still 'Northrops', but with the El Segundo plant fully taken over in 1939 by Douglas they were from that moment Douglas planes. The type designation of the BT-2 was soon changed into SBD-1 it received the name 'Dauntless'. SBD-1 and 2s were the most important dive bombers of the U.S. Navy when the war with Japan started and the type played a major role in the Second World War!