

N. H. HAUPRICH

THE GOODYEAR AMPHIBIANS

In January of 1944, Goodyear Aircraft Corporation, Akron, Ohio, completed construction of their GA-1 amphibian. The aircraft was a high-wing, single engine pusher, boat-type amphibian. The cabin, seating two, was forward of the wing. Construction was all metal, with the exception of fabric covering of the wings and control surfaces. The retractable landing gear pivoted forward and inboard to rest against the hull, remaining exposed. The wing was equipped with leading edge slots designed for maximum controllability at low speeds. Wing floats were constructed of laminated plywood. The tail wheel was mounted on an experimental torsion rubber bushing developed at Goodyear Aircraft. This basic torsion bushing has been retained on all versions of the "Duck" and "Drake".

The aircraft was originally powered by a 107 H.P. Franklin, 4-cylinder opposed engine with reduction gearing. The engine was fully cowled and mounted on a cantilever pylon with an auxiliary fan to cool the engine during extended taxiing. The propeller was a Sensenich adjustable pitch with wooden blades. (Photo No. 1.)

After the first few flights the 107 H.P. engine was replaced with a 125 H.P. Franklin, 6-cylinder opposed direct drive. This was a prototype engine and did not have CAA approval. The cantilever pylon was retained for a short time with the new engine installation but was later replaced with an externally braced unit. Both a Sensenich adjustable pitch and a Koppers Aeromatic F-20 constant speed propeller were used with the new engine.

On both the original aircraft and the modified version, a set of detachable wheel fairings were used. Wing flaps were added to the modified aircraft. (Photos 2 & 3.)

The GA-1 was put through a rigorous flight test program and, after eliminating the bugs that plague a new design, received an Airworthiness Certificate on June 27, 1944. The number assigned was NX 36280. The aircraft was used for research and sales promotion until 1949. In January of 1949 the airplane was scrapped.

The color scheme of the GA-1 was as follows: the hull and engine unit were left natural aluminum finish while the wings, rudder and horizontal tail

surfaces were Goodyear Yellow. Trim was Goodyear blue.

In 1945 engineering was started on the GA-2 prototype. By March, 1946, the construction of the XA-11 was completed and Airworthiness Certificate NC 36281 was issued on December 12, 1946.

This aircraft was a three-place, pusher type with 145 H.P. Franklin 6AL - 335 engine above the wing on an externally braced pylon. A blower, integral with the propeller shaft, assured proper engine cooling even during a long downwind water run or enforced idling. The original exhaust system was downward through individual stacks, but was later revised to manifolds through the upper front of the cowl. Propeller was a Koppers Aeromatic constant speed.

Hull was all metal using an NACA developed design. A water rudder retracted into the air rudder assuring a high degree of maneuverability on the water. All control surfaces were of metal construction. Wings were fabric covered metal construction with NACA 23012 airfoil. Torque loads were carried through a diagonal rib type of truss. Wing slots were incorporated assuring excellent stall characteristics. Wing floats were all metal and had excess buoyancy to prevent digging in.

Landing gear was of conventional tripod design incorporating Goodyear wheels, tires and brakes. The brakes were of single disc type and worked either wet or dry, a must for amphibious aircraft. Retraction of the gear was done electrically and the tail wheel was interconnected.

A large access door provided easy entrance and the entire canopy on the pilot's side folded upwards, allowing the occupant to stand erect for mooring or docking.

This aircraft was used as a test vehicle in Goodyear Aircraft's flight test program. Tours were made over the United States and many interested parties had a chance to fly in the "Duck." One of the enthusiastic passengers was Professor O. C. Koppen of Aeronautical Research Foundation. Many U.S. Navy officers were given a chance to fly the amphibian and the response was very gratifying. While at Anacostia, Col. la Duce and Col. Doe of the French Air Force were (honored) passengers.

Although the aircraft had received its "NC," the nature of its work required the "NX" status to be used. Therefore, the license number NX 36281 remained on the "Duck" until she was scrapped in February of 1951.

The color scheme was similar to the GA-1. (Photos 4 & 5)

After the warm response to the GA-2 prototype, Goodyear launched a limited production run of 15 amphibians designated GA-2. These aircraft

were to be distributed to qualified operators in various parts of the world for evaluation. Customers reactions were to be tabulated in view of possible large scale production.

The production GA-2 was a single engine, three place amphibian, with a Franklin six cylinder 6A4-145-A3, 145 H.P. engine driving a Sensenich Hi-Low pitch propeller. Engine cooling was provided by a cast aluminum fan mounted on the propeller hub as in the prototype.

The aircraft was equipped with dual controls, wing slots, electrically retractable gear and retractable water rudder. This design was approved under Civil Aeronautics Administration Type Certificate No. 784.

Construction was all metal, 24ST Alclad except for fabric covering of wings and rudder. Hull design was NACA 40 BE modified. Wing airfoil tapered from NACA 23015 at root to NACA 23009 at the tip. All tail surfaces were NACA 0009 section.

The first production GA-2 was completed in March, 1947, and the last in October, 1947. A two year program of evaluation had been set up and as the aircraft came off the line they were assigned to various operators.

The results of the tests showed that the "Duck" had performance far superior to any existing amphibian at the time. Results of crashes involving the aircraft showed the safety factor inherent in the design. At no time, no matter how severe the accident, were the occupants more than bruised and shaken up. One point of interest is the fact that in no case did the engine pylon break loose. This had been anticipated in the design stages and the structure was able to absorb loads well above those encountered.

During the two year period of operation the Goodyear Cross-Wind landing gear was developed and installed on several "Ducks." Modifications to the rudder were also made to facilitate the operation of the water rudder.

In 1949 it was decided to improve upon the GA-2 design and six aircraft were modified to GA-2B status. This redesign involved a general improvement of the airplane with respect to utility, comfort and serviceability, including additional equipment such as instrumentation for blind flight and extra fuel capacity. The higher approved gross weight necessary was balanced by an increase in horse power. The new power plant was a Franklin 6A4-165-B3 engine of 165 H.P. driving a Koppers Aeromatic constant speed propeller.

The hull had a modified bow keel and chine to reduce spray. An after-body step was added to shorten the water take-off run. Doors and cabin structure were redesigned to strengthen and improve fit. A one piece windshield was fitted and many other minor improvements were made.

The GA-2B's were also leased to operators for evaluation. Again the response was very favorable. However as time went by, the increased cost of production finally eliminated the chance of the "Duck" to reach production status. In 1951 a total of four sets of GA-2 wings were sold for use on the Fulton Airphibian. Comments from Mr. Fulton indicated the wings were very satisfactory.

The first production model GA-2 (NX 5500M) was flown on June 24, 1947. The NX had been issued on March 24, 1947. The aircraft was assigned as a demonstrator to Goodyear Aircraft Corporation. Many celebrities in the aviation world flew this airplane. Following is a list of some of these people and the date of their flight in the "Duck."

Max Karant June 25, 1947

Arthur Godfrey August 19, 1947

Bevo Howard September 27, 1947

Zack Mosley (Smilin' Jack) September 30, 1947

Betty Skelton October 1, 1947

Mr. Paul W. Litchfield¹, then President of Goodyear Tire and Rubber Company, used NC 5500 M while at Lake Tamagami, Canada, in August of 1947.

In November, 1949, work was completed on the conversion to model GA-2B. The new license was N 5500M. During 1951 the GA-2B was used by Goodyear Wingfoot Fliers as a water trainer. Date of scrapping is not known. (Photo No. 6.)

The second "Duck" (NX 5501M) first flew on July 21, 1947, and received her NC on August 19, 1947. On August 25, 1947, it was delivered to Westchester County Airport, New York, for evaluation by the AFA Squadron. This was a six man team composed of Ex-Air Force pilots. Its purpose was to evaluate new aircraft and publish the results in trade journals. The report of this group was quite favorable and was printed in Air Force, November 1947. Demonstrator of the amphibian at this time was Mr. Neil Fulton of Atlantic Aviation Corporation, Teterboro Air Terminal, Teterboro, New Jersey. The "Duck" was flown back to Akron on November 2, 1947.¹

December 28, 1947, saw the aircraft at Hummel Aviation, Hopewell,

¹Air Force (November, 1947), p. 32.

Virginia, for examination. The test period was to last until January 3, 1948. On July 24, 1948, the "Duck" was sent to Wingfoot Lake, Ohio for use in company operations. The aircraft remained at this site until conversion to GA-2B on August 14, 1949.

After the amphibian had been modified, it was assigned to Goodyear Aircraft Sales Division, Akron. License number was now N 5501M. Last logged time on the aircraft was on March 31, 1955. On October 17, 1955 the amphibian was pickled and later scrapped. Total time on the airframe was 504 hours and 5 minutes.

The next ship off the line was NX 5502M, on July 25, 1947. From this time until November 18, 1948, 5502M was used at Akron for flight tests. Yarn tuft surveys and spray tests took up the major portion of time.

On November 29, 1948, the airplane was delivered to the Aeronautical Research Foundation, Norwood Airport, Boston Massachusetts. A series of tests were planned for noise reduction study. Variations of configuration used in the tests were as follows:

1. Four bladed propeller (solid blade) with standard exhaust system and direct drive engine.
2. Four bladed propeller, no muffler.
3. Three bladed propeller, with muffler.
4. Four bladed propeller, with muffler.
5. Six bladed propeller, with muffler.
6. Eight bladed propeller, with muffler.
7. Eight bladed propeller, with muffler located on upper wing surface at starboard root.

Tests 2 to 7 inclusive were run with a geared Franklin 6AG4-180-B3 engine, Serial No. T-357.

Tests 3 to 7 inclusive were made using a Maxim silencer (muffler). (Photo No. 7.)

Propellers used in tests 2, 4, 6 & 7 were mounted in an eight bladed hub adapter, those used in tests 3 & 5 were mounted in a six bladed hub adapter. All propellers and propeller hubs were furnished by Sensenich.

Results of the above tests indicated that a small noise reduction would be attained with the use of multi-bladed propellers operating at a slow RPM. With the use of a variable pitch propeller, the performance would not be seriously impaired.²

²U. S. National Advisory Committee on Aeronautics, NACA Technical Note 2727, July 1952.

Comparison tests were conducted against GA-2B NC 5510M and a standard 1948 Stinson Voyager 165. Comparative propeller installations were made on the Stinson. Results showed the pusher configuration had a higher noise level than the very sharp directivity of the tractor. This means that the pusher sound was audible over a point for a longer interval of time.

NX 5503M flew for the first time on August 22, 1947, and was relicensed on September 2, 1947, as NC 5503M. Immediately after receiving its "NC" the aircraft was delivered to CIA Mexicano de Aeroplanos, S A in Mexico City and flown in Mexico until October of 1947, when it was returned to Akron. Here it was fitted out with crosswind landing gear on November 17, 1947. After a brief time as test ship 5503M was put into storage where it remained until relicensing and assignment to Wingfoot Lake Airship Operations in May 1951. Here the "Duck" was completely checked out and sent to Litchfield Park, Arizona. On July 11, 1958, while running up the engine preparatory to take-off, the prop threw a blade. The blade missed the aircraft but the imbalance destroyed the engine and damaged the engine pylon. The aircraft has been scrapped.

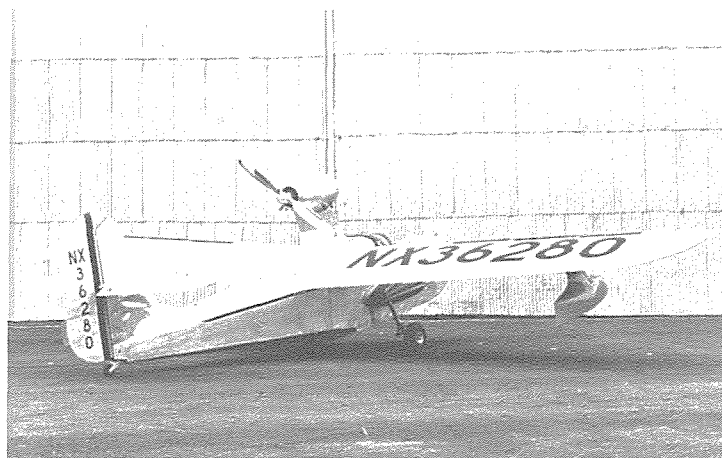
NX 5504M rolled out for its first flight on August 22, 1947, and was licensed as NC 5504M on the same day. After "debugging," the "Duck" was delivered to Northeast Aviation, Portland, Maine, on September 6, 1947. During its stay in Maine the aircraft was pressed into forest fire work for a period of five days. Returned to Akron on October 31, 1947. On July 15, 1948, the airplane was leased to Twin Coach Company, Kent, Ohio, until August 31, 1948.

This amphibian underwent modification to a GA-2B and flew as N 5504M on June 28, 1949. On March 29, 1951, the aircraft was sent to Goodyear Flying Club, Goodyear Tire and Rubber Company, St. Marys, Ohio.

The final day arrived on September 23, 1951, when 5504M was demolished. The pilot, H. J. Fee, was practicing touch and go landings at Converse Airport, Indiana, when the engine failed at take-off. The pilot made a normal straight emergency landing into a cornfield bordering the airport. Upon entering the field the right wing tip float was sheared off and the aircraft veered over and ended up on its back. The pilot suffered a bruised leg, but the "Duck" was a complete washout.

The next amphibian produced was NX 5505M. First flight was on September 15, 1947, and as NC 5505M on the same day was delivered to Fliteways, Incorporated, Milwaukee, Wisconsin. Evaluation tests were made until November 1, 1947, when the aircraft returned to Akron. After checkout, the "Duck" was leased to Southern Aviation Corporation, Shreveport, Louisiana, from December 6, 1947, until January 23, 1948. 5505M was then used in the Goodyear fleet until July 10, 1948, when she went back to Fliteways, Incorporated.

On October 28, 1948, the aircraft was involved in a forced water landing



GA-1
Original version with 107 H.P. and
Sensenich propeller.

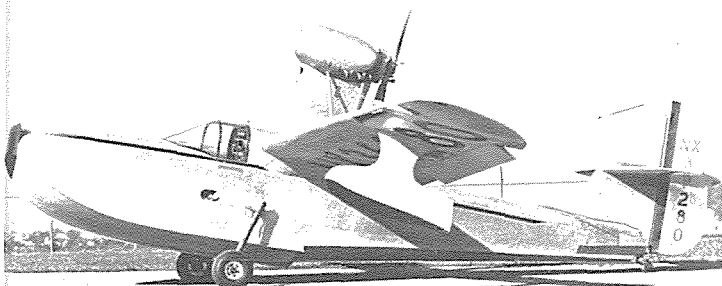
8-2-44



GA-1
Modified, with 125 H.P. engine and
cantilever pylon.

2-1-45

THE GOODYEAR AMPHIBIANS



GA-1
Modified, with 125 H.P. engine and
externally braced pylon. Note absence
of wheel fairings.

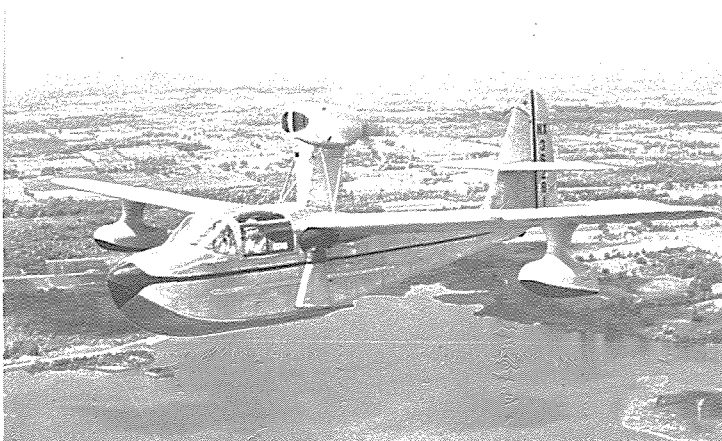
10-18-45



GA-2
Original GA-2 prototype with downward
exhaust stacks and non-faired landing
gear.

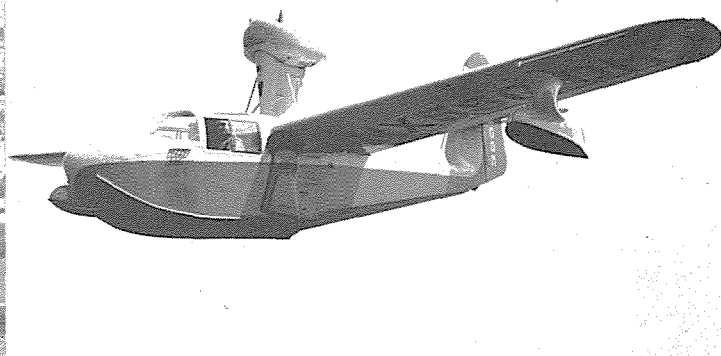
3-8-46

Photos from GOODYEAR via Nick Hauprich



GA-2
Modified prototype with exhaust manifolds
and faired landing gear.

6-7-46



GA-2B
NX-5500M near Lake Erie. Pilots Art Chapman
and C.N. Rossall.

6-10-47

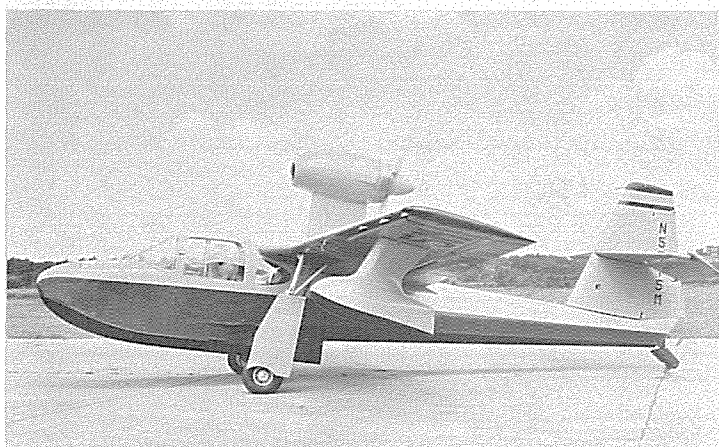


GA-2
NX-5502M used by Aeronautical Research
Foundation for noise reduction study. 6-23-49

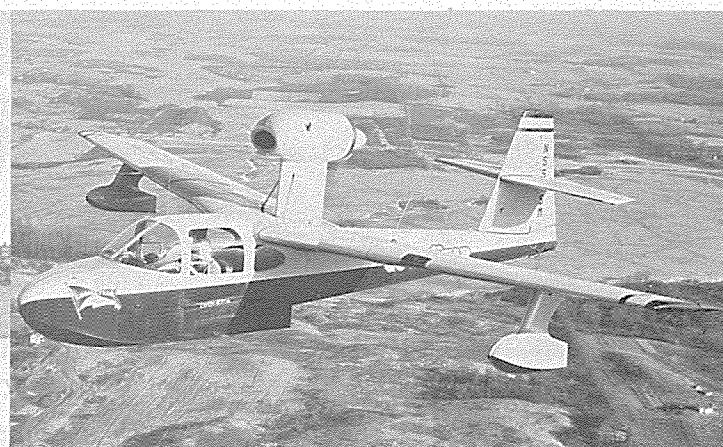


GA-2B
NC-5510M ready for delivery, Alaskan Flag
on engine nacelle. 6-9-48

THE GOODYEAR AMPHIBIANS



GA-22
N-5515M. Art Chapman, pilot. 7-10-50



GA-22
In flight over Mogadore Lake. Dick Ulm,
pilot. 1-31-51

Photos from GOODYEAR via Nick Hauprich



GA-22A
In original paint scheme. 8-19-53



GA-22A
In present paint scheme with new floats. 9-24-57

due to a fuel pump failure. The accident occurred at South Turtle Lake, Wisconsin. To avoid crashing into a wooded shoreline the pilot made an abrupt water landing, hitting the surface at approximately 95 mph. The hull suffered no damage in spite of the impact, however, the right wing float was torn off and the right wing severely damaged and later scrapped. The airplane was dismantled and shipped back to Akron and put into storage.

Modification to GA-2B was completed on December 28, 1949. As N 5505M the "Duck" served with the company fleet until transfer to Goodyear Wingfoot Fliers Inc., Akron Municipal Airport. The aircraft is still in service at the present time. The 1000 hour overhaul will be completed by the end of June 1959.

The next amphibian, NX 5506M, had her maiden flight on September 3, 1947. Between September 13 and 16, the "NC" was issued. After completion of tests and installation of cross-wind gear the "Duck" was delivered, on January 8, 1948, to Dade Brothers, Newark Airport, Newark, New Jersey, for export to Sweden. A program was set up for evaluation and demonstration in several European countries including Belgium and France. The aircraft starred in the European movie "Illegal Entry." She was scrapped in Luxembourg in December of 1950.

The eighth "Duck" of the line was first flown as NX 5507M on September 26, 1947. NC license was issued on September 30, 1947. On October 10, 1947, the aircraft was delivered to the J. D. Reed Company, Houston, Texas for evaluation.

This amphibian was lost on October 29, 1947 in Galveston Bay, Texas. The pilot attempted a water takeoff in three to four foot waves, well beyond the capacity of the aircraft. The left wing float was torn off and the hull was badly damaged near the step area. Shortly thereafter the aircraft sank in about eight feet of water. The pilot and passenger used the inflatable seat cushion life preservers until they were picked up by a small boat. The "Duck" was salvaged and shipped back to Akron and the parts used for spares. See also 5512M and 5514M.

The next aircraft to roll off the line was NX 5508M. Her maiden flight was on September 22, 1947. She received her "NC" on September 29, 1947, and flew to Southern Airways Incorporated, Atlanta, Georgia on October 2, 1947, for demonstration. On October 4, the amphibian went to Hawthorne Flying Service, Jacksonville, Florida. The aircraft remained there until November 14, when it was transferred to the Hawthorne Flying Service in Charleston, South Carolina. Here the "Duck" was under the care of Bevo Howard until January 16, 1948, when it was flown back to Akron.

Modification was started to install cross-wind landing gear and the work was finished on July 23, 1948. On August 21, 1948, the airplane was delivered

to Northwest Aviation Sales, Incorporated, Troutdale, Oregon, where it remained until November 6, 1948. No further record of this aircraft until it was dismantled and salvaged by February 27, 1951.

Next on the list was NX 5509M. Her first flight was on September 26, 1947, and she received her "NC" on September 30.

From October 11, 1947, until December 7, 1947, the airplane was assigned to Southern Airways Incorporated, Atlanta, Georgia, and on September 4, 1948, the "Duck" was leased to General Electric, Syracuse, New York for evaluation. At one time the aircraft was used as a target for anti-aircraft radar tests.

On February 11, 1949, the General Electric pilot, Henry M. Wales, was returning the aircraft to Akron from Syracuse. From an altitude of 4000 feet the "Duck" suddenly went into a steep spiral dive. Despite the pilots efforts, the ship was uncontrollable. At the last moment, the pilot applied power and full back stick to avoid a cliff and mashed into a wooded ravine. The "Duck" ended up in a vertical nose down position, the entire nose section crushed back to the cockpit. Mr. Wales suffered minor bruises and stated that injuries would have been severe if the aircraft had not been so rugged.

The reason for the crash was an unhinged rudder, locked in full left position. The probably cause of the rudder becoming unhinged was an abnormal load applied to one rudder pedal when the pilot stretched out while reaching for a pocket knife. Modifications were made on all existing aircraft to prevent a recurrence of this accident.

At the time of the accident the amphibian was two years old and had a total of 89 hours flight time. The airplane was dismantled at the crash site and shipped to Akron. Salvaged parts were put in stock as spares.

NX 5510M's maiden flight was on October 1, 1947, and she received her "NC" between October 11 and 23. She was flown to Hummel Aviation, Hopewell, Virginia, on November 15, and returned to Akron on January 19, 1948.

In May of 1948 the "Duck" was fitted with cross-wind landing gear and an experimental auxiliary fuel tank. The new tank was made of Pliocel, developed by Goodyear Tire and Rubber Company. This aircraft was a companion ship with NX 5502M at the Aeronautical Research Foundation. It was flown in Standard configuration for noise level comparison with the multi-bladed propeller used on NX 5502M.

After the noise level tests were concluded the amphibian was assigned to the Alaska Division, Goodyear Tire and Rubber Company, Seattle, Washington. She was demonstrated for a total of 60 flight hours and visited Elmsdorf Field, Anchorage, and Ladd Field in Fairbanks. Note Alaskan flag on nacelle. (Photo No. 8.)

The first flight for NX 5511M was on October 6, 1947, and her "NC" was issued on October 6. On October 24, the amphibian was flown to Wooten Aviation Industries, Orlando, Florida, where it remained until January 16, 1948. The aircraft was returned to Akron for use in the company fleet until cross-wind landing gear was installed in August.

The next stop for this "Duck" was to the Aeronautical Research Foundation in the fall of 1949. Upon return to Akron, the aircraft was put in storage. It was later dismantled and scrapped.

The next "Duck", 5512M, had a very eventful and involved life. She made her maiden flight as NX 5512M on October 9, 1947, and received her "NC" on October 13.

On November 1, 1947, the ship was delivered to Miami Aviation Center, North Miami, Florida. After the usual tests it was sent back to Akron on January 1, 1948. At this time there was much talk of a test plane utilizing the new NACA planing hull. It was decided to decommission 5512M and convert her to the new hull concept. The airplane was decommissioned on January 19, 1949.

The new aircraft was a composite job. The wings, tail surfaces and engine installation were taken from the original 5512M. The hull afterbody, from salvaged NC 5507M, was rebuilt into the NACA hull. This particular aircraft did not have a landing gear and was therefore classed as a flying boat. Experimental license NX 5512M was issued in August of 1948, and the first flight was on September 14. The airplane was then delivered to the United States Navy and designated XGA2PT. A complete series of water tests were made at Lake Mogadore, Ohio, in comparison with a GA-2. The results were evaluated and published in a U.S. Navy report.³

In March of 1949, the XGA2PT was relicensed with the number N 5514M. For future history of this airplane see data on 5514M.

GA-2 number NX 5513M was first flown on October 16, 1947. She was licensed as NC 5513M on October 27, and was assigned to Goodyear Aircraft Sales Division.

In August of 1951, NC 5513M was sent to Wingfoot Lake Airship Operations, replacing NC 5503M which was sent to Goodyear Aircraft Corporation, Phoenix, Arizona. Cross-wind gear was installed in April of 1948. The last logged time on this aircraft was on May 24, 1954. Further data is not obtainable except that the "Duck" has been scrapped.

³Aircraft Year Book, 1949.

The next "Duck", 5514M, also had a short but eventful life. Her first flight was on October 21, 1947 as NX 5514M. The next day the ship received her "NC." On November 10, 1947, the aircraft was delivered to J. D. Reed Company, Houston, Texas, and on November 30, this "Duck" was crashed by the same pilot who cracked up NC 5507M. The aircraft was a complete wash-out. The pilot was unhurt. Evidence points to the fact that the pilot attempted a high speed keel landing and bounced about ten feet into the air. Recovery was not affected soon enough to avert a stall and the aircraft fell into an additional very heavy keel landing. Under full power and elevator control in up position the "Duck" bounced again, this time to about thirty foot altitude, and full stalled. The aircraft went into a nose down position and struck the water bow first. The bow was completely crushed back to the cabin. A passing power boat rescued the pilot and towed the damaged airplane towards shore. Here the "Duck" was moored and the pilot taken ashore. In the meantime the amphibian was slowly taking in water. In about one hour she sank in thirty feet of water. The aircraft could have been saved if the operator of the power boat had not been in such a hurry and completed the tow to shore.

Salvage operations were started and the airplane was raised, dismantled and shipped to Akron. The right wing and the hull were scrapped and the left wing was put in salvage. The engine was overhauled and listed as a spare.

The license number N 5514M was reissued to former NX 5512M (U.S. Navy XGA2PT) in March of 1949. After the tests with the Navy were completed the new 5514M was returned to Akron and fitted out as a two place cargo GA-2B equipped with cargo tie-down rings and increased horsepower. The new engine was a 6A4-165-B3 Franklin of 165 HP. Work on the GA-2B conversion was completed by January 18, 1950, and the cargo modification by May 24, 1950. This aircraft was assigned to Goodyear Aircraft Corporation, Sales Division until October 17, 1955. At this time the amphibian was pickled and put in storage and subsequently scrapped.

Through 1948 and 1949, the Engineering Department had been at work on a new design concept and on July 10, 1950, the new "Drake" amphibian made its first flight. All wind tunnel tests, on a scale model, had been conducted at M. I. T. under the supervision of Professor O. C. Koppen in 1948. This amphibian was a completely new aircraft although it followed the "Duck" basic lines as to general configuration. That is, it was a high wing amphibian, powered by a pusher propeller. The "Drake" was a four place aircraft powered by a Continental R185-6 engine of 190 H. P., Serial No. 20308-D-9-8, driving a controllable reversing pitch Hartzell propeller. As in the "Duck" series, engine cooling on the ground was accomplished with a blower on the propeller shaft.

The aircraft was equipped with throw-over wheel controls, a fairing enclosing the tail wheel and acting as a water rudder, cross-wind landing gear retracting into the wing. The hull was the NACA planing hull as tested on the XGA2PT. The aircraft was all metal and employed extensive use

of magnesium and Goodyear Bondolite sandwich material. As in the "Duck," the wings were equipped with wing slots and flaps.

Wing floats were all metal and designed with knock-off fittings to prevent damage to the wing structure in case of accidents. This feature has proven feasible several times in minor accidents. In March of 1956, the metal tip floats were replaced with experimental all fibre glass floats of greater displacement.

This aircraft carried the experimental designation at all times. The license markings were changed from NX 5515M to N 5515M and the word "Experimental" stenciled on the hull just below the door opening on the port side. Due to the experimental status of the "Drake," it remained based at Akron for its entire life. The amphibian was used for company business and demonstrations which enabled it to travel extensively and therefore be seen at many airports.

After due consideration of expenses involved in keeping an experimental aircraft airworthy, the company decided on scrapping the "Drake." There was a considerable amount of repair work to be done and the cost of maintenance was high, so after 668 hours and 5 minutes of flight time, the GA-22 went to the scrap heap. (Photos No. 9,10.)

The final evolvement of the GA amphibian series was the GA-22A "Drake." The design of this aircraft was the result of all the tests on the previous "Ducks" and the GA-22 "Drake." The result was a very high performance amphibian, still without comparison with any single engine amphibian flying today in its class.

The GA-22A is a four place, all metal aircraft, powered by a 225 H. P. Continental, E-225-8 six-cylinder, horizontally opposed engine, driving an all metal controllable reversing Hartzell propeller, Model HC 12 x 20-5E serial No. 6546(M).

The NACA planing hull characterized by a deep pointed step faired to the smooth afterbody was selected after analysis and comparative flight tests of the GA-2 and XGA2PT. Tests were also conducted with a wooden fairing fitted to the GA-22 that simulated the faired step of the GA-22A. This modification was incorporated in the GA-22A and the water stability characteristics were such that hands-off landings and take-offs are not difficult.

The reversible propeller and water rudder permits easy and safe maneuvering, docking and beaching. This feature also permits economical power settings with full power available if required and reverse thrust for taxiing on both ground and water. Short landings may be accomplished by reverse pitch in flight immediately preceding touchdown.

The airplane may be used as a light cargo carrier by removing the rear

seat and the left front seat. Excellent visibility is afforded the pilot and passengers and the hinged right windshield gives ready access to the anchor compartment and forward mooring cleats.

The GA-22A "Drake," NX 5516M, was completed in March 1953, and type certificate was issued on July 28, 1954. The aircraft is currently in service with the Goodyear Aircraft Corporation fleet at Akron, Ohio. (Photos No. 11, 12.)

Color scheme, as with all preceding amphibians, is Goodyear yellow and blue. Register numbers are in Goodyear blue over the yellow and yellow over the blue.

The majority of the flight tests were conducted by Engineering Test Pilots Art Chapman and R. "Dick" Ulm.

* * * * *

Bibliography:

1. Aviation Week, September 8, 1947, p. 44, July 7, 1947, p. 53.
2. Air Force, November, 1947, p. 32.
3. Aircraft Year Book, 1949.
4. Department of Commerce Bulletin, A-784-2, November 21, 1947.
5. Model Airplane News, November, 1947.
6. NACA Technical Note 2727, July 1952.
7. U. S. Navy, Research Division D.R. Report No. 1151.

* * * * *

"Hindenburg" Three-View:

Several members of the Society have written to the editor concerning the three-view drawing of the "Hindenburg" appearing on the inside rear cover of the Spring (5:1) issue of the Journal. This fine work was done by Willis Nye of 1719 Grove Street, Hayward, California. Mr. Nye was one of the original directors of the Society and is known nationally for his three-views appearing in various aircraft modelling magazines.

DESIGN COMPARISON OF THE GOODYEAR AMPHIBIANS

	GA-1 Prototype	GA-1	GA-2 Prototype	GA-2 Production	GA-2B	GA-22	GA-22A
Engine	Franklin Red. Gear 4ACG-199-H3	Franklin Direct Drive	Franklin 6AL-335	Franklin 6A4-145- A3	Franklin 6A4-165- B3	Continental R185-6	Continental E-225-8
Engine Rating	113HP at 3500 rpm	125HP	145 HP at 2600 rpm	145 HP at 2600 rpm	165 HP at 2800 rpm	185 HP at 2300 rpm	225 HP at 2600 rpm
Wing Span	36'-0"	37'-0"	36'-0"	36'-0"	36'-0"	37'-11"	37'-11"
Wing Area, Sq. Ft.	174.0	174.0	179.0	178.22	178.22	209.0	209.0
Gross Weight, Lbs.	1930	1980	2150	2200	2300	2875	3000
Empty Weight, Lbs.	1405	1455	1400	1500	1650	1875	1970
Useful Load, Lbs.	525	525	750	700	650	1000	1030
Wing Loading, Lbs./ Sq. Ft.	11.08	11.38	12.00	12.3	12.9	13.75	14.35
Power Loading, Lbs. /HP	17.08	15.84	15.9	15.1	13.9	15.54	13.3
Max. Speed, MPH	110	115	125 at 1000 ft.	125 at 1000 ft.	125 at 1000 ft.	133 at S.L.	137 at S.L.
Cruise Speed, MPH	101	105	108 at 1000 ft.	108 at 1000 ft.	108 at 1000 ft.	119 at S.L.	120 at S.L.
Landing Speed, MPH	53.0	53.0	53.0	56.0	59.0	55.0	63.00
Rate of Climb, FPM	-	-	650	650	750	775	900
Water Take-off Time, Sec.	56	56	27	27	27	27	26
Range: At 10,000 Ft. With 75% Power. Optimum Payload	-	-	470 Mi. With Full Load	470 Mi.	-	390 Mi.	575 Mi.
Max. Range	-	-		310 Mi.	450 Mi.	685 Mi.	865 Mi.

GAC Serial No.	GAC Model No.	CAA Number	First Flight	Cross-Wind Gear	GA-2B Mod. Complete	Propeller	Engine	Disposition
4017	GA-1	NX36280	1944	No	No	Sensenich	107 HP Franklin Red. Geared	
	GA-1	NX36280	-	-	-	Sensenich & Aeromatic F-20	125 HP Franklin Direct Drive	Scrapped
4018	GA-2	NX36281	Mar. 1946	No	No	Aeromatic	145 HP Franklin	Scrapped, GA-2 Proto.
4019	GA-2	NX5500M	June 24, '47	-	-	Sensenich Hi-Low Pitch	145 HP	Scrapped
	GA-2	NC5500M	-	-	-	"	"	
	GA-2B	N5500M	-	Yes	Nov. '49	Aeromatic	165 HP Franklin	Scrapped
4020	GA-2	NX5501M	July 21, '47	-	-	Sensenich	145 HP Franklin	
	GA-2	NC5501M	Aug. 19, '47	-	-	"	"	
	GA-2B	N5501M	-	Yes	Aug. 14, '49	Aeromatic (1)	165 HP Franklin	Scrapped, Total Time, 504 hrs. and 5 minutes.
4021	GA-2	NX5502M	July 25, '47	-	-	Sensenich 78 Cel 70 4-Bladed	180 HP Geared Franklin, Serial T-357 6A GA-180-B3	
	GA-2	N5502M	-	-	-	Sensenich	145 HP Franklin	Scrapped
4022	GA-2	NX5503M	Aug. 22, '47	-	-	Sensenich	145 Franklin, Serial S-15002	
	GA-2	NC5503M	Sept. 2, '47	Oct. 17, '47	-	"	"	
	GA-2B	N5503M	-	-	Nov. 15, '49	Aeromatic	165 HP Franklin	Scrapped
4023	GA-2	NX5504M	Aug. 22, '47	-	-	Sensenich	145 HP Franklin	
	GA-2	NC5504M	Aug. 22, '47	-	-	"	"	
	GA-2B	N5504M	June 28, '49	Yes	June '49	Aeromatic (2)	165 HP Franklin	Crashed, Sept. 23, 1951

GAC Serial No.	GAC Model No.	CAA Number	First Flight	Cross-Wind Gear	GA-2B Mod. Complete	Propeller	Engine	Disposition
4024	GA-2	NX5505M	Sept. 6, '47	-	-	Aeromatic (3)	145 HP Franklin	
	GA-2	NC5505M	Sept. 15, '47	-	-	"	"	
	GA-2B	N5505M	-	Yes	Dec. 28, '49	"	165 HP Franklin	Still Flying
4025	GA-2	NX5506M	Sept. 12, '47	-	-	Sensenich	145 HP Franklin	
	GA-2	NC5506M	Sept. 13, 16, '47	Oct. 25, '47	-	"	"	Scrapped
4026	GA-2	NX5507M	Sept. 26, '47	-	-	Sensenich	145 HP Franklin Serial 15008	
	GA-2	NC5507M	Sept. 30, '47	-	-	"	"	Crashed, Dec. 2, 1947
4027	GA-2	NX5508M	Sept. 22, '47	-	-	Sensenich	145 HP Franklin Serial 15022	
	GA-2	NC5508M	Sept. 29, '47	July 23, '48	-	"	"	
4028	GA-2	NX5509M	Sept. 26, '47	-	-	Sensenich	145 HP Franklin Serial 15014	
	GA-2	NC5509M	Sept. 30, '47	-	-	"	"	Crashed, Feb. 11, 1949
4029	GA-2	NX5510M	Oct. 1, '47	-	-	Sensenich	145 HP Franklin	
	GA-2	NC5510M	-	May 11, '48	-	"	"	Scrapped
4030	GA-2	NX5511M	Oct. 6, '47	-	-	Sensenich	145 HP Franklin	
	GA-2	NC5511M	Oct. 15, '47	Aug. 12, '48	-	"	"	Scrapped
4031	GA-2	NX5512M	Oct. 9 '47	-	-	Sensenich	145 HP Franklin	
	GA-2	NC5512M	Oct. 13 '47	-	-	"	"	Decommissioned January 19, 1948
	XGA2PT	NX5512M	Sept. 14, '48	-	-	Aeromatic	"	Planing hull flying boat. Also see 403.

GAC Serial No.	GAC Model No.	CAA Number	First Flight	Cross-Wind Gear	GA-2B Mod. Complete	Propeller	Engine	Disposition
4032	GA-2	NX5513M	Oct. 16, '47	-	-	Sensenich	145 HP Franklin Serial 15003	
	GA-2	NC5513M	Oct. 27, '47	Apr. 26, '48	-	Aeromatic (4)	"	Scrapped, total time 286 hrs. and 10 minutes.
4033	GA-2	NX5514M	Oct. 21, '47	-	-	Sensenich	145HP Franklin Serial 15019	
	GA-2	NC5514M	Oct. 22, '47	-	-	"	"	Crashed, Nov. 30, 1948
	XGA2PT	NX5514M	Sept. 14, '48	-	-	Aeromatic	145 HP Franklin	
	GA-2B	N5514M	-	Yes	Jan. 18, '50	Sensenich	165 HP Franklin	Scrapped
4034	GA-22	NX5515M	July 10, '50	Yes	-	Hartzell Serial 4894	185 HP Continental (5)	Scrapped, total time 668 hrs. and 5 minutes.
4035	GA-22A	NX5516M		Yes	-	Hartzell	225 HP	
	GA-22A	NC5516M		"	-	"	Continental "	Still Flying

1. Aeromatic propeller installed on N5501M was removed from N5504M on Jan. 5, 1953.

2. Aeromatic propeller installed on N5504M was removed from N5505 on Jan. 19, 1951. This propeller was removed from N5504M on Sept. 22, 1951, the day before the aircraft cracked up, and was sent to Koppers for repairs. It was then installed on N5501M, which see. Note 1.

3. Aeromatic propeller removed and installed on N5504M. Replaced by another Aeromatic propeller.

4. Aeromatic propeller replaced the Sensenich on Jan. 19, 1952.

5. On October 3, 1951, the original 185 HP engine, serial number 20308-D-9-8 was replaced by another 185 HP engine, serial number 25679-D-1-8.

On GA-2's...Koppers Aeromatic propeller, model F200 with 00-78 blades. See 4024, 4018.

On the GA-2B's...Koppers Aeromatic propeller, model F200 with 00-76 blades. See 4019, 4020, 4022, 4023, 4024, and 4033.