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# MODEL WORLD

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THE Z.506 SEAPLANE

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# THREE ENGINED ITALIAN



*Franco Bugada looks at the CANT Z.506 seaplane. With photos by Franco Bugada, Carlo d'Agostino collection and Carlo Martegani*

**T**his month we report on a wonderful creation by a great Italian aeromodeller, Carlo Martegani. Carlo has been manufacturing R/C model seaplanes for a long time, and he is very well known for the Schneider models that he has built, like the Sopwith Tabloid, Farman 1913, Macchi M.33, Macchi M.7 bis and Savoia S 22.

He participated at the Calshot R/C Schneider Trophy contest in 1981, flying his R/C replica of a Sopwith Tabloid, and achieved second place behind another Italian aeromodeller, Carlo Bergamaschi with his Macchi M.39. Third place went to our British friend, Rob Millinship with his Supermarine S6B. Seventeen models competed at Calshot – two Italian, one French and fourteen British.

## **COMPANY ORIGINS**

In recent years, Carlo has studied the seaplanes manufactured by Officine Aeronautiche del Cantiere Navale Triestino, which was founded in 1923 to increase the activities of CNT, who

previously only operated ships (Cantiere Navale) and railways (Officine Ferroviarie and Officine Elettromeccaniche). This industrial group was created between 1920 and 1923.

In 1923, Raffaele Conflenti, an expert engineer, became Aeronautical Technical Manager, and Filippo Zappata was his collaborator as Technical and Experimental Division Manager. Aircraft production began in 1924 with the CNT7, a flying boat built under the specification of SISA, a civil transport air company connecting Turin with the Trieste area. Also in 1924, two Schneider racers were built, designated the DGA3.

After 1925 the name CNT was modified to CANT. The CANT 6 was a military three-engined torpedo bomber, modified for civilian service. Between 1925 and 1926 the CANT 10 and CANT 10 ter were developed and built for SISA. The CANT 10 bis was destined for the Royal Aeronautical Military Service as a light bomber. Two amphibians, designated the CANT 13, were also manufactured. And for aerobatic schools, the CANT 18 was produced in series.



Filippo Zappata left CANT in 1926 and worked for Bleriot in France until 1933.

Between 1927 and 1932 four prototypes were built as the CANT 25 and 25 M. In the same period (1926-1930) CNT also worked under a SIAI license and built the S.59 bis, as well as the S.55 (a famous aeroplane used by General Italo Balbo for crossing the Atlantic Ocean, flying south to Brazil and then north to Chicago).

Between 1928 and 1932, SISA substituted their aircraft by using the three-engined CANT 65 Mk.II, CANT 22 and 22R1. The CANT 23 was a civil biplane for land airfields, but the prototype did not generate any further production.

In 1930 the world economic crisis forced the reorganisation of CANT, which had suffered from some financial troubles. Italian government intervention pushed the banks to help the factories. In 1930 the Cantieri Riuniti dell'Adriatico (CRDA) company was created. In 1933 more help came with the introduction of the Istituto di Ricostruzione Industriale (IRI),

which had a long life.

A typical aircraft produced during this period was the metal version of the S.55, which was equipped with larger floats. Between 1932 and 1934 a series of CANT 25 M and 25 AR aircraft, with removable wings, assured the life of the company. The Italian Navy Air Force placed an order for the CANT 35 and 37.

Some big names in Italian aeronautics were employed by CRDA, like SISA School Manager, Semprini; a famous Schneider pilot, Adriano Bacula; and Mario Stoppani, also a SISA Chief Pilot. Raffaele Conflenti left CANT in 1933, joining Caproni. Filippo Zappata returned and substituted Conflenti, at the particular request of government minister, and Atlantic pilot, Italo Balbo.

During his time in France, Zappata designed the famous Bleriot 110, an aeroplane that held speed records for closed circuit, as well as straight line flying. After his arrival CANT aeroplanes were named with the letter Z, for Zappata.



**ABOVE:** Prototype of Z.506 A, I-CANT, in its final livery. The Italian flag crosses the red fuselage and the tips of the wings (C. d'Agostino)



**BELOW:** Filippo Zappata left CANT in 1926 and worked for Bleriot until 1933. After his return, CANT aeroplanes were named with the letter Z, for Zappata



**ABOVE:** CANT Z.506 prototype without the Italian flag on the fuselage (Fotocelere card, 1939 – F. Bugada collection)

The 500 series designated the seaplanes, and 1000 designated the company's landplanes.

In 1934 a new Zappata design flew for the first time. This was the CANT Z.501, which took the distance record for seaplanes. Many international records followed in the period 1934 to 1938; in 1937 alone, 14 records honoured the CANT Z.506. This aeroplane was designed to meet the needs of Mediterranean transport, particularly for the Italian government airline, Ala Littoria.

**Z.506 AND DEVELOPMENTS**

In 1934 the CANT Z.505, a three-engined seaplane equipped with twin floats was designed to seat twelve passengers. Ala Littoria was interested in the route of Roma-Siracusa-Bengazhi. After a series of tests the seaplane was found to be underpowered and a new design appeared in 1936 with different motors. This was the Z.506 Airone (Heron), having very good performance and floating capability, even in rough water conditions.

From 1936 this aircraft established sixteen records, including 11 speed records, three distance in closed circuit and two load-to-altitude. The prototype, marked I-CANT (M.M.291), made its first flight in August 1935. The livery was all red with silver cowlings, floats, struts and back part of the wings. The Italian flag was painted around the fuselage between the trailing



**ABOVE:** Z.509 at take-off, in silver and red livery, with white and black fascism roundels on the wingtips. This version was destined for the Ala Littoria Linee Atlantiche, but landplanes were preferred (postcard, 1938 – F. Bugada collection)

edge of the wing and the tail. A big black 'I' was painted on the silver rudder.

In 1937 this first prototype received the 770 hp Wright Cyclone SGR-1820-F52A. The second prototype, I-ORIA (M.M.292) underwent military tests in January 1936. The original was designed for the 700 hp Piaggio Stella X R, but both the two prototypes were fitted with the Fiat A 59 RC at the beginning of their life. These engines were manufactured in Italy under a Pratt & Whitney licence for the R-1690 Hornet. On I-ORIA the engines were substituted with the Alfa Romeo 126 R.C.34, which was more powerful, and rated at 750 hp. Originally the seaplane was capable of carrying twelve passengers but in subsequent versions this was raised to eighteen.



**ABOVE:** Z.506 C civil version during take-off (C. d'Agostino collection)

**LEFT:** Z.506B in silver with red stripes on the wings. Nationality roundels on the wingtips were black on a white circle. The Italian flag is visible on the rudder (C. d'Agostino collection)

A landplane version, with fixed landing gear, was built by modifying the seaplane I-POLA, by eliminating the twin floats and using the landing gear of an SIAI S.81. The pilot, Mario Stoppani, attempted to make an endurance flight starting from Elmas in Sardinia, but the weather conditions meant the attempt was cancelled. The endurance flight project was then abandoned due to Ala Littoria requesting to have the plane back in a seaplane arrangement for use on their transport routes. The landplane version had the typical livery of silver and red, with the Italian flag around the fuselage.

In 1937, I-LERO obtained twelve international records. This aeroplane was equipped with three 780 hp Alfa Romeo 126 RC 10s.

Military demands obliged CANT to revise the design and so, in 1937, the Z.506 B was born and equipped two Squadrons and one Naval Bombing Group (Bombardamento Marittimo).

The nine-cylinder motors were three Alfa Romeo 126 R.C.34s, air-cooled, giving 820 hp during take-off and 750 hp at 2300 rpm, at 3400 m. And so a seaplane bomber finally came in to Strategic Reconnaissance service. The major difference was the long ventral bomb bay on the bottom of the fuselage and the dorsal stepped line of the fuselage. A semi-retractable turret, fitted with a dorsal machine gun, was installed on the top.

Production of the Z.506 B began in 1937, with a first series of 32 aircraft entering into military service in 1938 (Series I). A new civil version, the Z.506 C had some small modifications and was capable of carrying 14 passengers. A long and experimental route was made by I-ALAL: Cagliari-Gambia-Bahia-Rio de Janeiro-Natal-Dakar, and finally Roma.

A special military version, without any armament (Z.506 B, I-LAMA), attempted and gained the straight line record in 1937 (Cadiz, Spain to Caravellas, Brazil – a distance of 7013 km). During the flight back, the seaplane was forced to return to Natal due to a fire in the left engine. Mario Stoppani landed on very rough water and the crew tried to save their lives by perching on the wings. An explosion destroyed the seaplane, and only Stoppani was saved thanks to a Lufthansa Dornier D.18 that landed and rescued him. The D.18, however, was unable to take-off due to the sea conditions, so it was obliged to await the arrival of a catapult ship, equipped with an aircraft retrieval crane.



**ABOVE:** Carlo's model makes a fast water taxi before take-off



**Throttling up for take-off**



**Airborne!**



*Climbing away, with water trickling off the floats*

On Z.506 B, behind the front bottom gondola windshield, was the bombardier accommodation. Behind him, a Breda Safat 7.7 mm machine gun was mounted, equipped with 500 rounds. The bomber seaplane was employed on an experimental basis during the final period of the Spanish Civil War by the Ejercito de l' Aire. Their base was San Juan de Majorca.

In 1938 Poland placed an order for six Z.506 B, and a further 12 in 1939, destined for their Naval Wing. History shows that a crew of Polish aviators flew the first seaplane to Poland on 27th August, 1939. Some days later Poland was invaded by Germany. The unique Polish Z.506 B was destroyed by German fighters whilst floating on the water, and the other Polish aeroplanes remained in the hands of the Italian Regia Marina. It is interesting to know that, theoretically, the Aichi company of Japan was interested in a construction licence, but it is not known if the Z.506 B was also built in Japan.

CRDA was not the only company to produce the Z.506 B; Piaggio also manufactured the aeroplane at their factory in Finale Ligure.

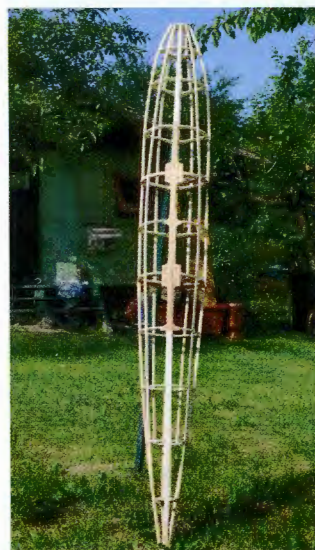
The 31st Stormo Autonomo Bombardamento Marittimo of Elmas (Cagliari) and 35th Stormo Bombardamento Marittimo, located in Brindisi, were equipped with the Z.506 B. At the beginning of the war, ninety four Z.506 B's were employed as bombers against French, British and Greek forces. They participated in the occupation of Corfu, Kefalonia and Zante islands during the springtime of 1941. However, this aircraft was not fast enough for bombing, so the Italian Navy decided to use it for coastal reconnaissance, convoy escort and U-Boat discovery.

The most important series produced by CANT was the XII, having a bomb load of 1200 kg and a dorsal Caproni-Lanciani Delta E turret, equipped with a 12.7 mm or two 7.7 mm Breda SAFAT machine guns.

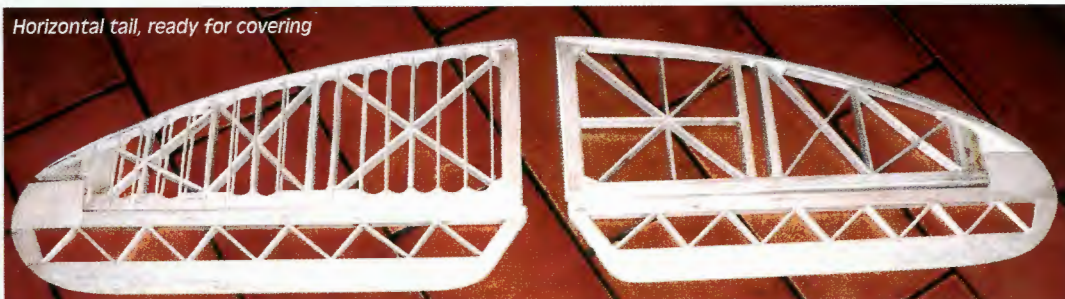
Both the Regia Marina and Luftwaffe used a certain number of Z.506 S (Soccorso) for air rescue and transport. This particular version, built by Piaggio, included safety boats, four stretchers, a special hook, a water tank, a retractable ladder and ropes on the floats. Between 1940 and 1942 more than 200 people were rescued by this aeroplane. In the spring of 1943 eleven rescue sections were established.

After the armistice the new Raggruppamento Idro entered into the Co-belligerent Air Forces against the RSI (Italian Social Republic) and Germany. After the war all the surviving Z.506 B's were converted to 'S' versions by SIAI and SRAM, and employed for SAR (Search and Rescue). Their Command was located at Vigna di Valle, on Bracciano Lake. They served on many occasions, including the 1951 Po Valley flood. In 1959 the 84th group of Vigna di Valle was still equipped with the Z.506 S, but these planes were destined to be broken up. Only one example, from the 189th Squadron of Augusta, has been saved. It made its first wartime mission in 1942. It is a version 'B', modified into a version 'S', and can be found in the Museum of Vigna di Valle, marked 84-4.

Coming back to the aeroplane's history, the next development of the Z.506 was the seaplane Z.509, which had more wing area and more powerful motors suitable for the transatlantic flights requested by Ala Littoria. The line of Zappata seaplanes



*The structure of one of the floats*



*Construction uses birch and poplar plywood, with stainless steel plates in high stress areas. Balsa is used for filling some open areas. The model has a span of over four metres, yet weighs less than 25 kg*





**ABOVE:** Fuselage frames are made from poplar plywood, covered in balsa

**RIGHT:** Bare bones shot of the impressive scale model



was completed with the four engine Z.511. Aviation policy then turned to more rapid landplanes, with both Z.509 and Z.511 aircraft going to the Aeronautical General Staff. A small series of fifteen twin-engine Z.515 reconnaissance seaplanes were made but production did not continue. Instead, resources were reallocated to help with the production of the company's landplane bomber, the CANT Z.1007. A total production of 315 Z.506 B and S's were built by CRDA and Piaggio up until 1943. The CANT Z.506 seaplane remained in service until 1960.

Concerning the livery of the Z.506 B, it was totally silver, with red sunbeams on the top of the wing, a dark olive green anti-glare panel in front of the windshield, with the bottom of the aircraft being light grey. Some aircraft used for medical service were all white, with a red cross on the wings and on the fuselage; the Italian flag was painted on the tips of the wings and on the rudder.

Construction of the Z.506 was all wood, from spruce and poplar, with tulipifera panels. The floats were all metal, with riveted panels of aluminium.

### CARLO'S R/C MODEL

Carlo Martegani made a replica of the Z.506 B, converted to the 'S' and marked 84-4, which can be found at the Museum of Vigna di Valle. So, he was able to take a lot of photos to reproduce many scale details. Unfortunately, he was unable to see inside the plane or to view the cockpit, which was a slight problem. But he did find some detailed drawings, allowing him to reproduce as much of the aircraft as possible, particularly the main structure.



The job is well advanced, and the engines are being fitted with fibreglass cowlings

The model is manufactured in four main parts for ease of transport: the two wings (connected to the centre section with two plates and eight pins), the main central part, complete with the floats and the three engines, and finally the rear part of the fuselage, including the tail. This part is connected with six bolts. Internal access is via the dorsal turret.

The model was manufactured using different types of wood. The scale is 1:6.5, which gives it a four metre wingspan. Glass fibre cloth and resin were used for covering. The floats were fitted to the fuselage using a special building jig to ensure correct alignment. The frames are from birch and poplar plywood, positioned using pine and obechi stiffeners, and glued with epoxy resin. The planking uses balsa strips, 2.5 mm thick. The wing ribs are in the same position as on the original full-size plane; they are manufactured in birch and poplar, with lightening holes. The wing section is the same as the full-size – as designed by Filippo Zappata.

## MODEL WORLD DETAILS

### Z.506 SPECIFICATIONS

WINGSPAN:	26500 mm
LENGTH:	19245 mm
HEIGHT:	7465 mm
WING SURFACE:	93 sq metres
WEIGHT:	8300 kg empty
WEIGHT TOTAL:	12.300 kg
CREW:	4
MINIMUM SPEED:	121 km/h
MAXIMUM SPEED AT 4000 M:	373 km/h
CRUISING SPEED AT 400 M:	313 km/h
MAXIMUM CEILING:	7870 m



Carlo fixes on the canopy



*With the petrol engines all running at a low rpm, the seaplane is taken to the water sitting on a special wheeled dolly*

Stainless steel tubes and plates are used to connect the fuselage to the floats. The parts are fixed using screwed angle bolts.

Motor bulkheads are from 6 mm birch plywood and are glued to the main structure using a 2.5 mm box of birch plywood. These boxes are also used for installing the fuel tanks, electronic ignition systems and servos. Three pine beams, measuring 20 x 10 mm, form the main spars, and they are tapered to follow the wing thickness. The main, middle beam works to oppose bending forces; the other two, forward and aft, are active against any torque effects. The space between any two ribs is partially occupied by plywood panels, to produce a double 'T' beam. The wings are positioned using 8 mm aluminium alloy plates and connected with 0.8 mm stainless steel plates and 4 mm diameter bolts of the same material. Inside the wing, 5 kg.cm. digital servos are installed to activate the ailerons and flaps. The flaps are divided into two parts, again for transport reasons.

The wing covering, from the leading edge to the first beam, top and bottom, is made with 0.6 mm thick birch plywood. The 90° position of the stabiliser, in respect to the vertical tail, is obtained using four oval pine struts of 10 x 8 mm, plus four struts. The position is adjusted using stainless steel plates and angle bolts. Dummy oil radiators are installed, two on the left and one on the right wing. The three gasoline engines (DLE 30s) are mounted without any thrust angles. The cowlings are from fibreglass, moulded over cast plaster, and the windshields are obtained from 0.8 mm transparent sheet, vac formed over wooden moulds.

The horizontal tail is in balsa and has a symmetrical section, the same for the vertical tail and rudder. Tail controls are moved by 8 kg.cm servos.

The model's Centre of Gravity is in a similar position to that of the full-scale plane, i.e. 10 mm before the float step. The floats are equipped with a hook for towage and a cleat for mooring. The receiver and servos are fed by two 3000 mAh LiPo's. A single 2500 mAh NiMH battery, fitted with three outlets, feeds ignition power to the three engines.

The cockpit shows instruments on the first and second pilot panel boards: radio, compass, three rpm counters, air speed and rate-of-climb indicators, gyrocompass, altimeter, commutator for ignition magnetos, three oil thermometers, three oil pressure gauges, three gasoline gauges, a long range compass, fire indicator, propeller pitch indicators and a clock with totaliser. On the left wing, the pitot tubes are placed on rib no.18.

The first flight was made by Carlo's friend – and the official 'test pilot' of all Martegani models – Max Comolli. No difficulties were found at all and the take-off and flight were very realistic thanks to the size of the model, at 4.10 m span, and the combined engine power of 12 hp, propelling a mass of less than 25 kg.

Carlo would like to record the help that he got from his friend, Cente Parola, who took care of all the drawings, and Max Comolli, who supervised the CAD drawings. Also, his friend Stefanoni for the CNC cutting, and all the jobs done by Nicola Calò, who spent a lot of hours taking photos in Vigna di Valle Museum, allowing the making of a detailed replica of the aeroplane with many scale details.

We would also like to record our thanks to the manufacturer of this great model, Carlo Martegani, who supplied some photos and gave his collaboration to the author. **RCMW**



*Z.506 S by Carlo Martegani makes a climbing turn*



*The size of the Z.506 S is clear when seen close to the FN 305 and Macchi MC 200 in the Vigna di Valle Museum. Turn to page 122 for some scale detail pictures of this impressive seaplane*





Note the difference between the unpainted part of the front cowling and the other part covered in aluminium varnish

## ON THE COVER

Carlo Martegani modelled his magnificent CANT Z.506 S on the aircraft displayed at the Italian Air Force Museum. The pictures shown here were taken by Franco Bugada to illustrate his article on this three-engined seaplane, which starts on page 84



One of the two bombs normally loaded on the Z.506 B, and details of the struts connecting the floats to the fuselage



The Italian Air Force Museum is situated at the site of the old seaplane station of Vigna di Valle, on the southern shore of Lake Bracciano. The Museum, built by the Italian Air Force, is set amongst the buildings and structures of the seaplane base and features 13,000 square metres of covered exhibits. It is divided into four large hangars, housing over sixty aircraft and a vast collection of engines.

The CANT Z.506S, on exhibit in Hangar Badoni, was built at the beginning of World War 2. It is the only example left of these seaplanes.

**RCMW**



Front view of the left engine



Details of a float and rivets



The tail and its struts



Bomb bay of Z.506 B, which was modified for loading rescue boats and other safety equipment when converted to an 'S' version



Aerodynamic fairings cover the strut connections to the floats



An underwing view of the right wingtip and aileron hinges