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On the cover

STINSON L-5 SENTINEL

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STINSON L-5B

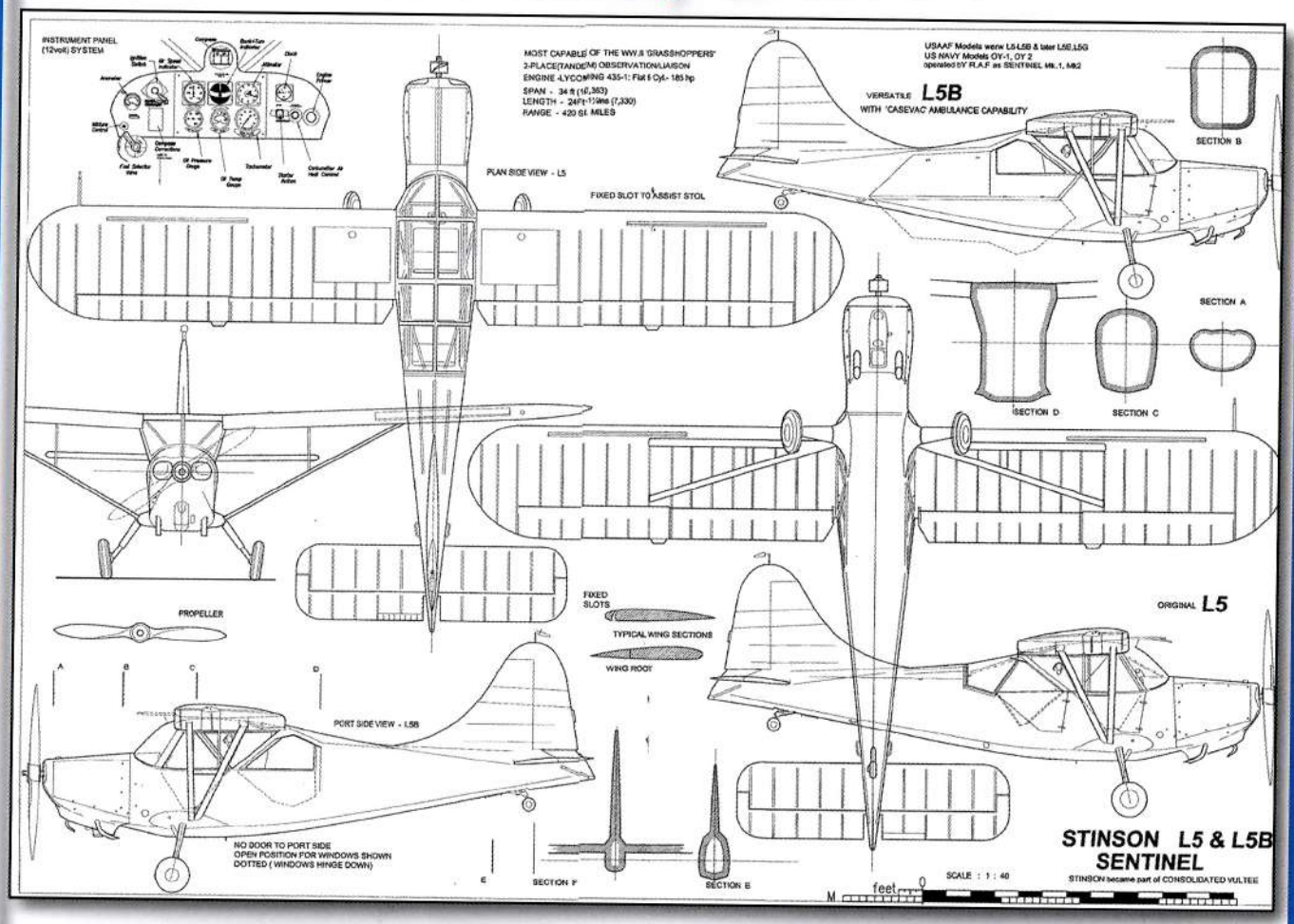
The "Sentinel" at 1:4.5 scale

Umberto Ghirardelli

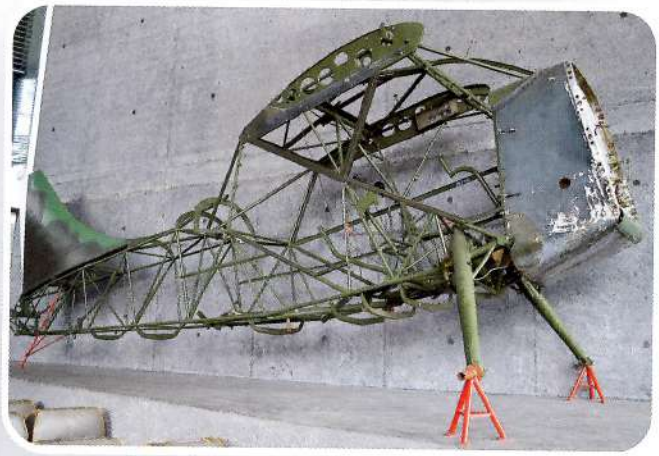
From the start of the first lockdown in spring 2020 and right through the general restrictions during 2021 we had very few opportunities to get to the airfield, and boredom, for a pensioner who has always been very active in life, is bad company. Since I was a young boy my hobby has been modelling in general, but my main interest soon became aeromodelling/flying. I have several models that are ready to fly, currently more than 15, and for the whole of 2020 I spent my time reviewing, improving and finding more practical and up-to-date solutions to

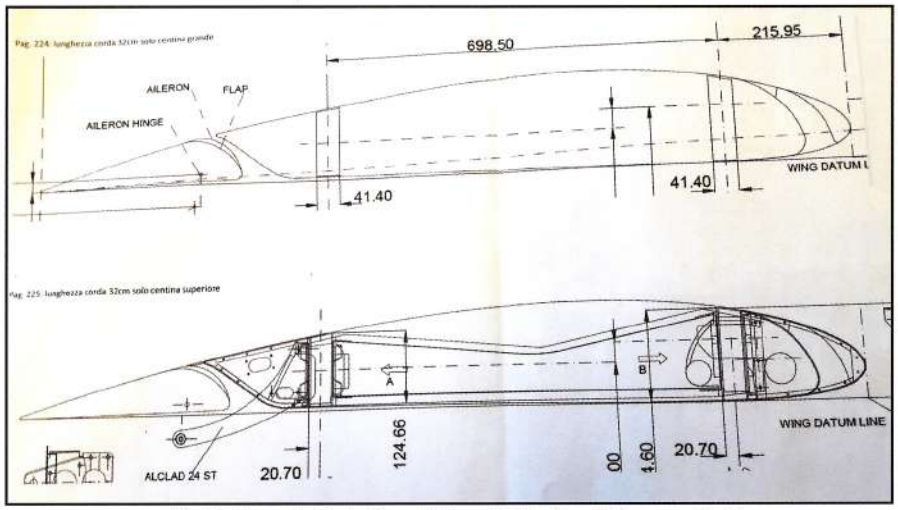
Enrico and Umberto Ghirardelli with the Stinson Sentinel

Short history of the L-5

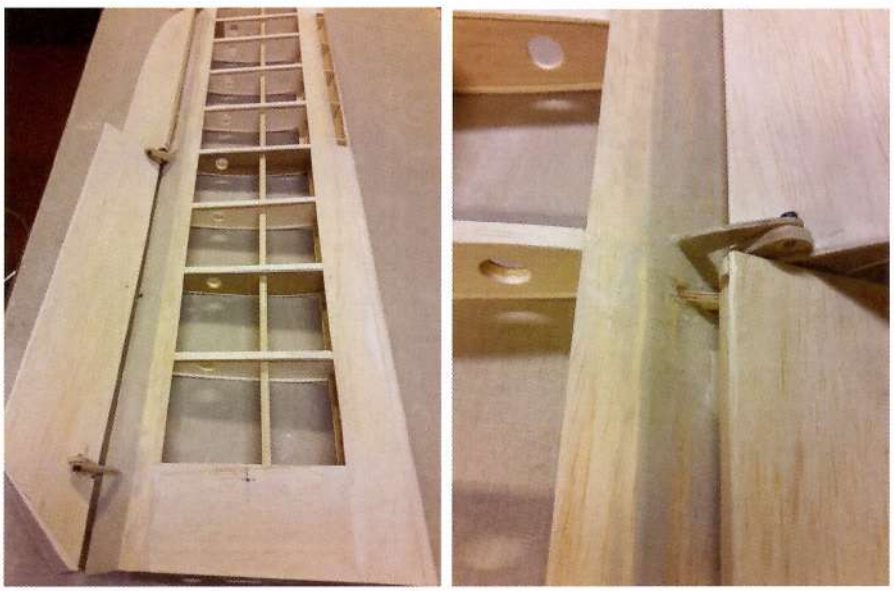


The L-5 made its first flight in 1941. It had a length of 7.33 metres, a wingspan of 10.37 metres, a wing area of 14.4 sq metres and a maximum take-off weight of 980Kg, powered by a horizontal 6-cylinder air-cooled 185hp Lycoming O-435 engine, giving it a top speed of 205km/h. The Stinson L-5 began its military role after the U.S. Army Air Forces acquired the first aircraft, and over time the aircraft underwent many modifications to adapt it to a wide variety of tasks, but today those that remain airworthy are mainly used as glider tugs. Structurally, it was a simple, inexpensive, fairly small and light transport and liaison aircraft with a high mounted braced wing and a mixed metal/wood frame structure. The decision at that time to reserve light alloys for the production of fighters resulted in the redesign of the aircraft with wooden wings and elevators, while the fuselage retained the welded steel tube structure. The cockpit had two tandem seats, the fuselage sides were lowered to improve visibility and clear roof panels were added. The main undercarriage's hydro-pneumatic shock absorber travel was increased almost twofold. Originally designated O-62, it was renamed in April 1942 as the L-5, following the introduction of the Liaison category. The main purpose of aircraft in this category was to perform liaison for the Army Air Force, and reconnaissance for the Army ground force artillery. A total of 3,590 aircraft were produced from November 1942 to September 1945. Although the official name given to the aircraft was Sentinel, its robustness and versatility led to it receiving the nickname "Flying Jeep". Obviously, as an Italian, I searched for some information about the history of the Sentinel flying in my country, and I learned that it operated in Italy with the Aeronautica Militare (Italian Air Force) until 1953, being decommissioned and given to the Aeroclub d'Italia.
The full size aircraft, painted as per the model I built, but with different markings, is on display at the Volandia museum in Somma Lombardo (Varese), Italy.





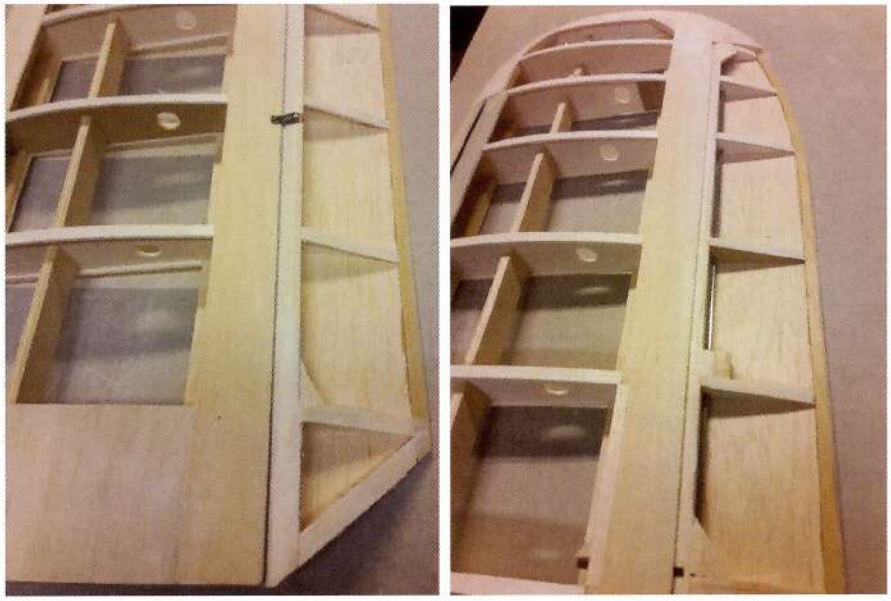
Airfoil and details of the full size Stinson L-5



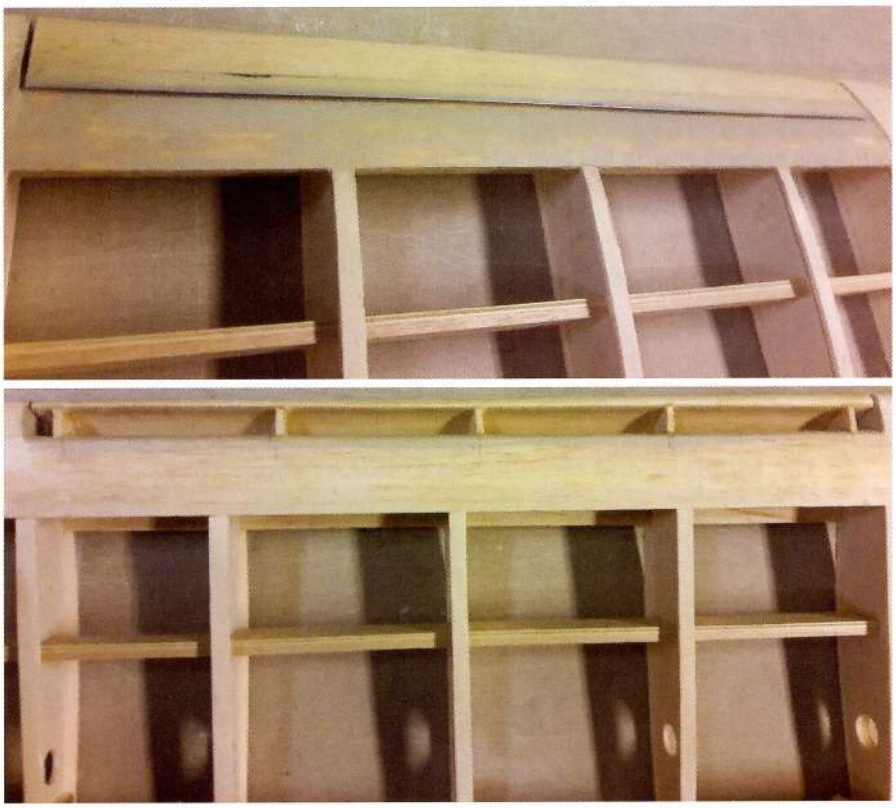
The flaps and aileron hinges have been designed to replicate those of the original aircraft, as they also have an aerodynamic function: the aileron hinges have been made so that the leading edge of the aileron protrudes from the top of the wing when the aileron is deflected down, this to reduce adverse yaw. The flaps are similar, but in this case to increase their braking effect

install in my models, some of which are more than 2 decades old. In recent years, electronics has also made some significant steps forward in our field, so I thought it useful to take advantage of this. But this commitment, now that we had reached December 2020, had come to an end! And I was starting to get impatient, bored but still enthusiastic, so my son Enrico, who knows me well, suggested a new build, the Stinson Sentinel L5, a tow plane that he knows extremely well. But I lack the space, I can't even fly some of my current models that have been sitting around for a long time.... The guest room already contains 4 large models with wingspans of around 240cm, and no more space is left in the two cellars and the garage! My passion for building has made me overdo it! However... I would need storage space "purely" for the fuselage, the two wings would find a place in the material loft. So I put up little resistance and decided to start building; needless to say, my son Enrico's commitment didn't stop at simple advice, he assisted throughout the build process with solutions and with photographs taken of the full size plane that flies from the Valbrembo airport, where he is a glider flying instructor with aerotowing qualification. From my friend Luca Oberti, the owner of the website https://gruppo-aereomodellisticocolibribergamo.blogspot.com, which lists many projects designed and developed by his father Raffaele Oberti, a well-known Italian designer and builder, including one of the Stinson L5, I obtained an enlarged example of the plans, with a wingspan of 230cm, thus at the scale of 1:4.5 that I wanted. He also provided me with a short kit of ribs and formers, and later on he will also supply the required and specially produced decals. Thanks Luca, not just for the time saved, but for the precision of the parts and how well they fit together! On the Internet, my son Enrico also manages to find the construction plans of the full size: over 200 pages full of drawings, sections and photographs. Since the fuselage is a tubular structure, this resource was particularly useful for the flap and aileron hinge points and for the details of the landing gear damping: I'll use springs, although the full size is hydraulic. I note that the full size airfoil is the same as that shown on the

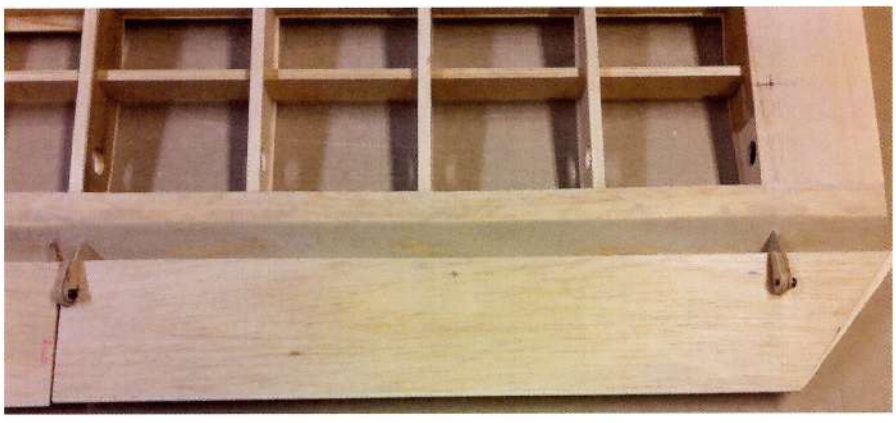
model's plan! Very good! I copied the exact hinge points of the flaps and ailerons because I consider them very important for realism, both on the ground and in flight. These hinge points are located below the axis of the airfoil, this off-centre position allowing the leading edge of the aileron of the inner wing in the turn, which rises, to protrude below, eliminating adverse yaw. In the case of the flaps, which of course only lower, the hinge is actually below the underside of the wing so that the leading edge of the flap projects above the wing, acting as a brake. For the hinges of the tailplane/elevator and the fin/rudder, I used 3mm clevises with 3mm threaded rod sections, flattened at one end and drilled to match the clevis pin (see photo). The two parts, which form a hinge, were glued into place, one to the fixed part of the flying surface and the other to the control surface itself. This can be seen in the photo. The construction of the wings and tail surfaces was carried out in the traditional way: ribs from 2.5mm balsa and spars made from a balsa and poplar plywood sandwich glued together. On the wings, the slats are made of 0.3 mm aluminium, shaped at the leading edge. At the trailing edge of the wing at the positions of the ailerons and flaps I fixed a 0.3 mm aluminium strip, thus obtaining the exact gap required between the fixed part of the wing and the control surfaces. The whole model is covered in military green Oratex fabric, protected from possible stains and dirt with a light coat of two-pack clear matt varnish. For all the clear parts of the cabin like windows, truncated cone at the tail, the roof and windscreen, I used 0.5 mm PETG as it has excellent transparency, some parts being attached to the structure with 1.2 mm self-tapping screws or 1.5 mm aluminium rivets. While building, the target was to keep the weight down to 7Kg, and I managed to do it! At the end the final weight was only 6.5Kg! I have an almost new O.S. 120AX engine, which will be ample, indeed probably more than is needed, for the 6.5Kg finished model. This fits entirely inside the cowling, which is rather small, although even the custom-built aluminium silencer is hidden within the confines of the cowl. The silencer proves to be a good idea, as the sound is almost like that of an



Flaps and ailerons are finished and ready to be covered in Oratex

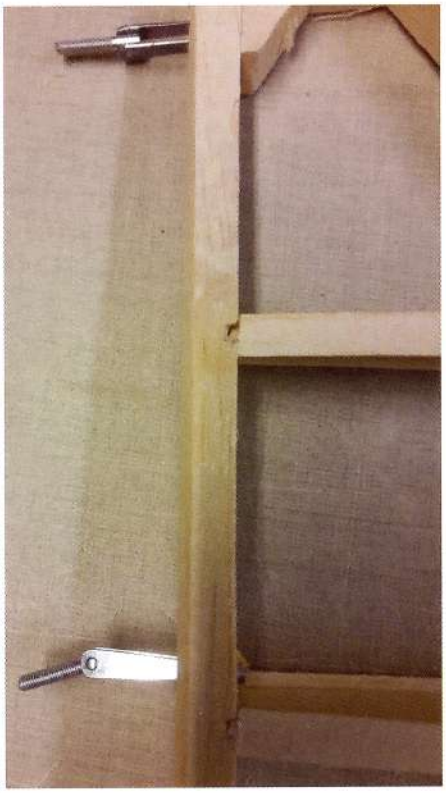


The Stinson L-5 has fixed slats and these have been replicated on the model

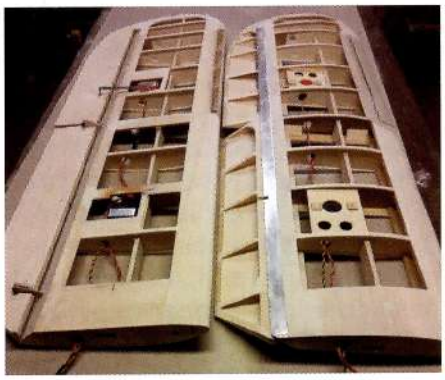


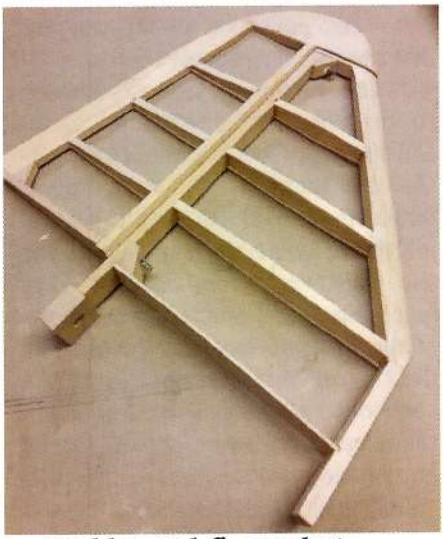
The gap needed to allow full movement

A 0.3 mm aluminium strip has been added to obtain the exact gap required between the wing and the control surfaces

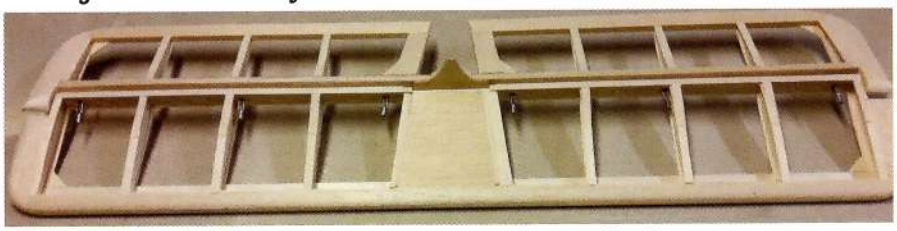


A close look at the elevator hinges

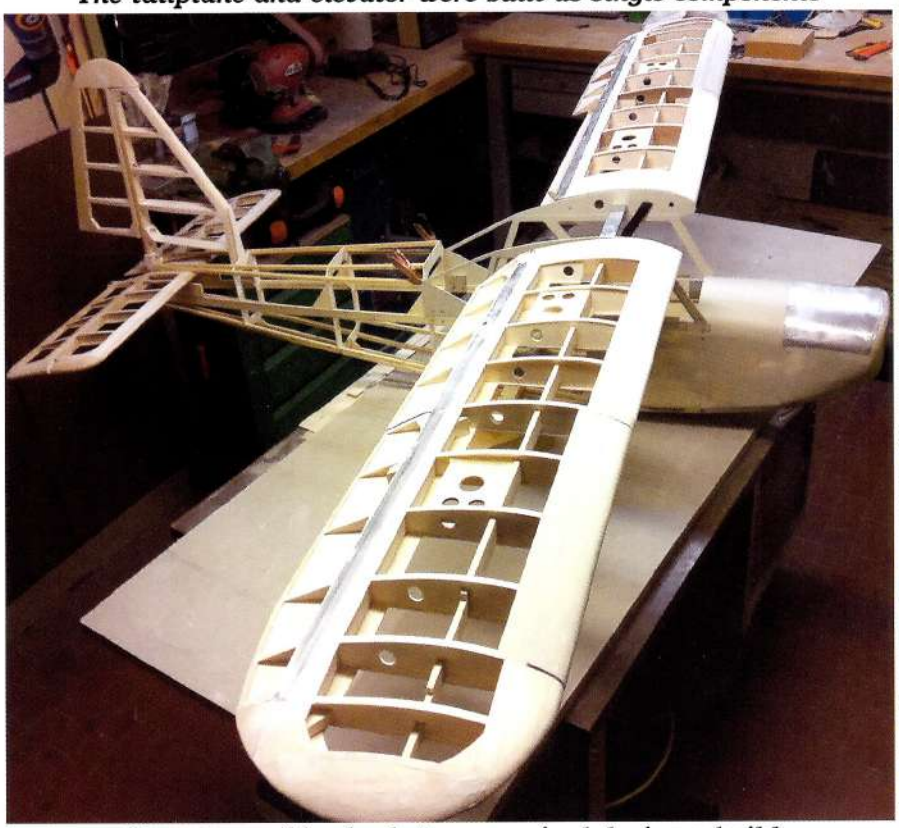




Rudder and fin ready to be fitted to the fuselage

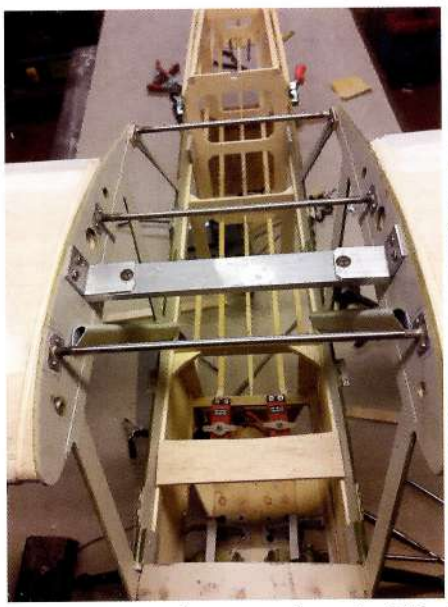


The tailplane and elevator were built as single components



Some "assembly checks" are required during a build

The traditional fuselage structure



The central part of the fuselage includes these welded struts and metal wing panel joiner

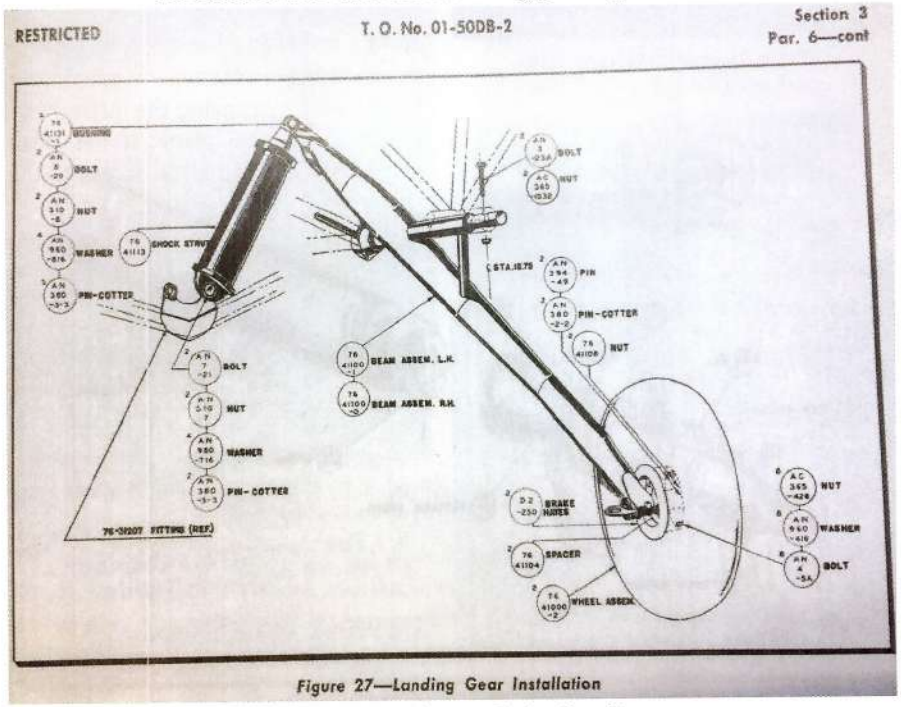
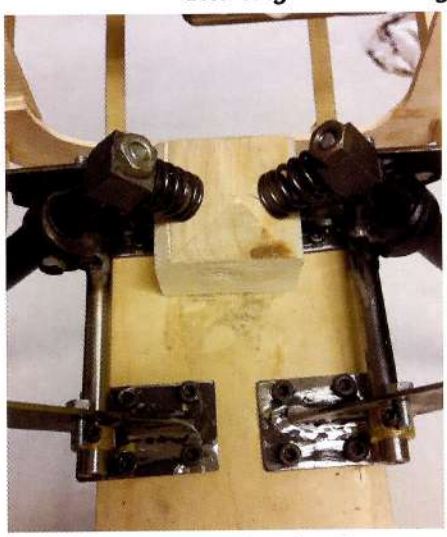


Figure 27—Landing Gear Installation

The original drawings of the landing gear

electric motor. The finished airframe is the first build I have completed that didn't require lead in the nose or tail to achieve the desired balance point. The cowl is removable: glued inside are tubes in line with the "hi" and "low" carburettor needles, allowing easy adjustment with the cowl in place. To securely mount the cowl, I fitted 4 aluminium inserts to the firewall, made on the lathe and having a 4.2 mm hole, whilst at 90 degrees to this is a 4mm threaded hole with dowel. The cowl has 4mm rods glued to it, in line with the 4 inserts glued to the firewall. This system is clean and secure, the only visible indication being the 4 small holes on the sides where the 2mm Allen key is inserted. The landing gear is hinged, with two pivot points, on a 5mm birch ply support fixed to the bottom of the fuselage, and the shock absorbers are based on two strong springs. Once in flight the springs unload and are stopped by the spring retainer. The legs of the landing gear are tapered at the end and I made them by cutting off the end of aluminium mountain poles. They were then reinforced by fitting a 4.5mm diameter piano wire rod inside and then filling the space with microballons and resin. I then bent the end part by 90 degrees to allow the springs to be attached. The fuselage build does not present any difficulty, but for the clear areas it is useful to give it careful thought in advance, given the structure: the stresses on the centre of the wings are of course entirely taken by this structure. I asked Luca to make the two sides in 3mm birch plywood because, having increased the scale, I thought it would



The landing gear has been accurately replicated, but the damping is based on springs rather than the hydraulic system used on the full size

Even the landing gear legs are painted

The wing struts are hinged on the wing panels

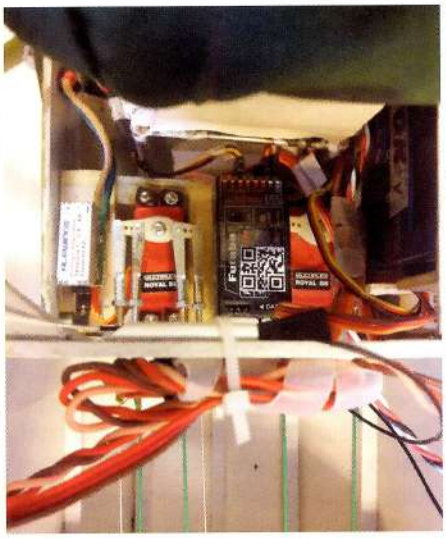
A clever way to access the "hi" and "low" carburettor needles

increase the strength of the structure. It is a semi-scale model, as the doors on the right, under the windows, have not been replicated. In their place I made a door large enough to access the interior, where the servos, receiver etc are installed. The pilot was fitted along with the instrument panel, this being made by copying the instrumentation of the real plane; it has been made removable to allow access to the

The opening cockpit doors on the left side

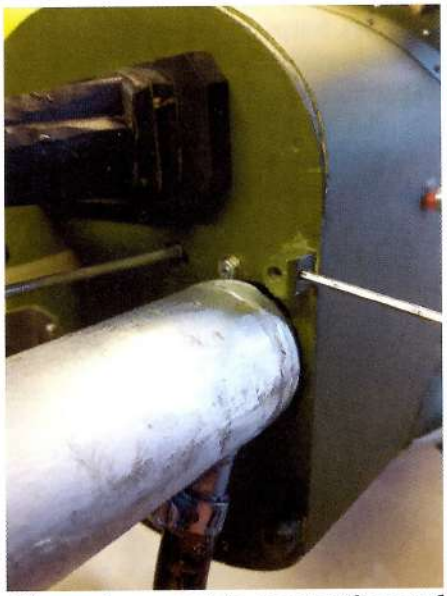
The instrument panel is also been reproduced as per the original

The OS 120AX fits perfectly in the engine cowl



The radio gear is quite simple on a model of this size

The observer forgot his camera on the backseat!



The system used to mount the cowl

tank and the engine mountings.
The day of the maiden finally arrived. The test took place at the Palosco airfield of the Bergamo "Falchi" Club without any problems whatsoever.
The high wing configuration, the airfoil used, the initial design, the low wing loading and the reliability and performance of the engine almost guaranteed an excellent flying performance from the model and in fact it was possible to carry out the flights with precision, elegance and without surprises. Obviously it's not a model which can perform high G aerobatic maneuvers, but during normal flying and gentle aerobatics or through the various touch and goes performed afterwards it proved to be on the pilot's side. It also proved to be a great glider, thus requiring the use of maximum flap deflection to reduce the length of the landing approach/run. To conclude, I can state that it's been another great adventure!

Umberto Ghirardelli