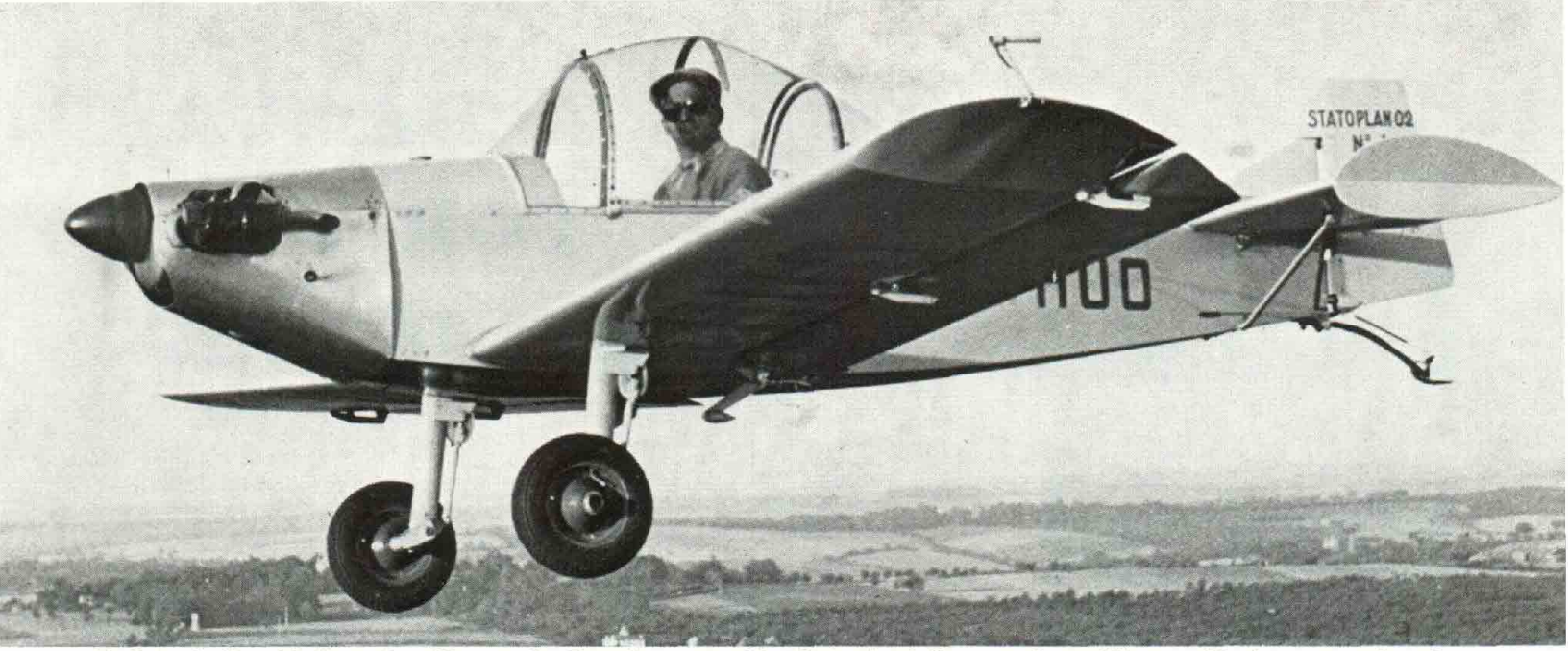

M. Gatard pilots his Statoplan .02 over the French countryside. Note the full span aileron/flaps, spill plates on tail and novel landing gear.

Is Your Elevator Necessary?

By Ron A. Cole

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Photos by the Author

It is an interesting fact that many designers of light aircraft have adopted the tandem wing layout; probably the first application was seen on the Peyret Glider which gained fame in the early twenties. Mignet exploited the layout further by moving the wings close together so that a maximum slot effect was gained. His "Pou" series of aircraft is still being developed and some are being made by amateur constructors in France. Since the war several other designers have produced tandem light aeroplanes with varying degrees of success.

There is much to be said for such aircraft, particularly when intended for amateur aviators. The slot effect over the rear wing can be combined with a loading distribution between the front and rear planes to give an unstallable aircraft. While a small nucleus of enthusiasts perseveres with the formula, others pour scorn upon it, probably because of the unusual handling characteristics.

Two aircraft which may be termed "pseudo-tandem" because they employ lifting tailplanes of generous area were seen at the 1957 rally of the Reseau du Sport Aerien. Known as Statoplan types 01 and 02, they both employ a unique control system originated by their designer M. Gatard. In principle this system is simple, yet it is so sound that it could have an important future.

To make a conventional aircraft climb, one lifts the elevators to apply a nose-up moment about the center of gravity. This has the effect of allowing the wing angle of attack to increase so that more lift is produced. Gatard's principle is to increase lift by lowering flaps and maintain pitching equilibrium by reducing lift on the tailplane. Thus at maximum lift the fuselage datum is at no more than four deg. to the horizontal, a feature which gives a good view and a low body drag.

It would appear that one of two landing techniques may be employed with a Statoplan and it is in this direction that the machine could be a definite advance. Following the approach at high lift, one can conventionally stall on to the ground or one can ease the stick forward to reduce lift and sink down. The second method would be preferable when landing blind, for the action of getting down keeps the aerofoil within its lifting range. Conventional landing technique is intrinsically dangerous because the aerofoil is taken to a point where the airflow breaks down. Misjudgment of the height at which this point is reached can only result in catastrophe; grim proof of this exists in the accident records.

Little but good! The Statoplan .02 built by M. Gatard of France. Power is a converted Volkswagen engine. Note large canopy.

Both the Statoplan types are small, in fact "diminutive" would be a better description. Type 01 is a high-wing strut-braced monoplane providing tandem seating for two in a totally enclosed cabin. Power is supplied by a 32 hp Poinsard horizontally opposed engine and the all-up weight is only 380 kg (840 lb.) Speed range is between 40 and 140 km/hr. (25 to 85 mph) while a duration of

more than three hours can be attained.

Aerodynamically, type 01 has a plank wing of moderate aspect ratio with rounded tips. The aerofoil is NACA 23012 throughout the span. A full-span slotted flap runs along the entire trailing edge with a break in the middle where the wing and fuselage meet. The flap is slightly twisted to give washout towards the tips. On a more advanced design it would be possible to arrange for both the wing and flap to be twisted; the problem is mainly a structural and financial one. The tailplane, of generous area, is all moving and employs NACA 23010 aerofoil section. It is strut braced and has bites in the trailing edge to allow rudder movement. Throughout their range of depression the flaps retain sufficient differential action for lateral control; they are operated by sideways movement of the stick in the conventional manner. Linkage and hook-up systems are unconventional, for apart from having to allow flap differential movement there has to be correct proportioning between flap and tailplane angles. Normal rudder control is obtained from the bar.

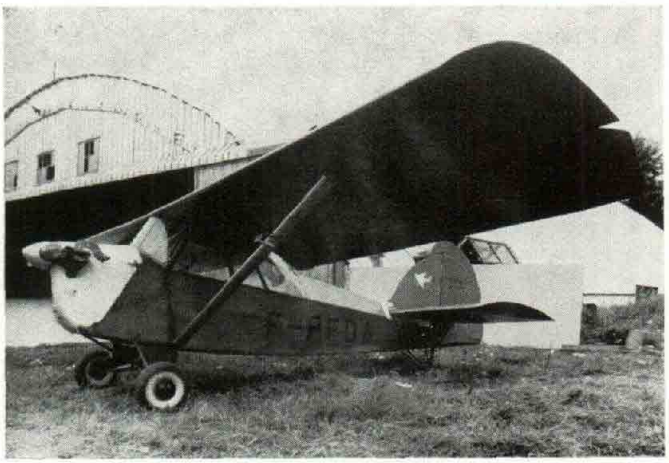
Statoplan 02 is a clean, low-wing monoplane accommodating the pilot in a bubble canopy situated towards the wing trailing edge. Power is supplied by a Volkswagen car engine and the all-up weight is but 280 kg (617 lb.). The aerodynamic layout is similar to that of the type 01; the same aerofoils are used with the exception that they have a smaller leading edge radius to reduce drag. Twisted flaps will be fitted at a later date, for it has been found that the existing straight ones are not quite so good. It was found that the single vertical surface had insufficient area although the moveable portion is adequate for control purposes. To make this good, end-plates have been fitted to the tailplane. Through cascade effect they increase the effectiveness of the central area without adding to the projected side area. In addition they increase the effective aspect ratio of the tail surface, partially offsetting their increment of drag.

Controls and their functions are exactly the same as for the 01 already described. The cockpit is situated well to the rear giving an unmistakable indication that the center of gravity is well aft, a feature of all tandem wing designs. Access to the cockpit is gained by sliding the canopy aft; in position it gives headroom for all but the very tallest and provides a remarkable field of view.

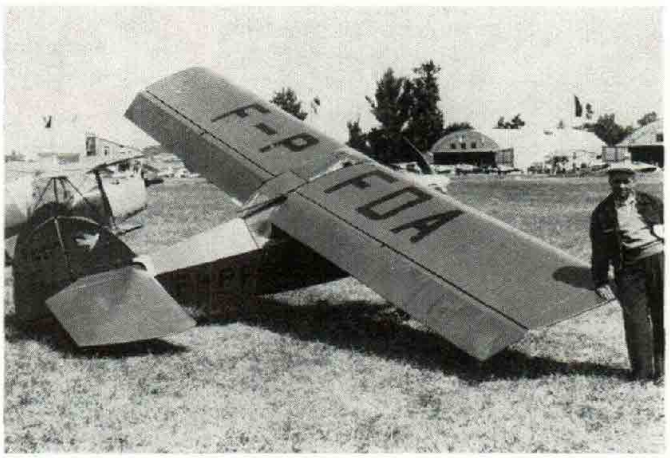
Proportions and dimensions make a very interesting comparison with more conventional aircraft in the same class. Span is 6 m (19.7 ft.), length 4.25 m (14 ft.), and the wing and tailplane areas are 6 and 1.5m^2 (64 and 16 ft.^{2}) respectively. Maximum speed is 145 km/hr. (90 mph) and the initial rate of climb is 3 m/sec. (590 ft./min.); on the whole a very good performance with only 26 hp. An interesting study is the simple type of levered suspension undercarriage. Each wheel is mounted upon an arm which pivots about the bottom of the cantilever main leg. At the opposite end of the arm a stirrup puts tension into some wide rubber bands which are anchored to a bracket at the top of the main leg. The rubber used looked like strips of lorry inner tube which were not standing up to the job very well. Bungee cord would probably be more satisfactory and would stand a 50 percent initial tension without deterioration.

Wooden construction is used throughout with the usual metal strong points; the whole airframe is covered with plywood sheeting to give a smooth finish. At present plans are in hand for getting the design passed for amateur construction; also there are hopes that the government may evaluate the machine officially and comment upon the control system. This would be an important event for the designer who has gone to the trouble of patenting the control arrangement. In addition, work is proceeding upon a third machine, which is a very smart-looking high-wing monoplane. It will be a "Cub" class machine.

How an aeroplane handles has an important bearing upon its future; in this direction it is noteworthy that no professional pilot ever took to handling a Flying Flea. After flying type 02 most pilots express pleasant surprise and an enhanced interest in the machine; this is a good sign to say the least. A typical demonstration manoeuvre is to close the throttle, pull the stick right back and fly 'figure eights' while parachuting down. There is no tendency for a wing to drop and ample lateral control is always at hand. For army co-operation, agricultural and any STOL type aircraft the Gatard principle would pay dividends. The fullspan slotted flaps and lifting tailplane allow very slow controlled flight and the picture may be improved with the addition of slots.



"L'Alouette", the Statoplan .01. Note thick section used in horizontal tail.



Monsieur Gatard demonstrates the light weight of his two-seater Statoplan .01. Note full span aileron/flaps and large single surface horizontal tail.