PILATUS B4

A Classic "All Round" Scale Glider from Flugmodellbau Geitner

A Pilatus?

I can't quite remember when I was bitten by the Pilatus bug. Friends questioned my sanity at the time and while in some ways that is normal, for once I had to concede that they had a point. In the world of the modern sailplane the Pilatus B4 is thought to be something of an ugly duckling and is affectionately known as 'Platty' (as in duck-billed platypus - I'm sure you get the picture). A little research showed that I was spoiled for choice as there are several European kit manufacturers who include the Pilatus B4 in their range. I followed my 'OCD' instincts and made up a list and comparison table which ended up with me settling on the Geitner version. Don't ask me how, because I couldn't explain the rationale I used, but I struck lucky.

What You Get

Geitner is a family business based in Austria, with an advertising strapline of 'Ausgereifte GfK-Technologie zu fairen Preisen' (Glass Reinforced Plastic (GRP) technology at a fair price), making a range of models that are mostly of scale sailplane subjects. They were a new supplier to me and placing an order with them was a bit of a step in the dark. It turned out that they were easy to deal with via email and all my queries were answered in English. A good model-maker is likely to have a waiting list and in that respect Geitner was no exception. Delivery was quoted at about 10 weeks, but in fact turned out to be about half that time.

My first impressions when the model arrived were of ambivalence. Surface finish was not quite up there with the standard of the best European competition sailplane makers, but then again, you do get a lot of model for the money. I guess I have been spoiled by

This model handles easily for launching by yourself.

the finish of some of my moulded F3F models. The fuselage has been painted in the mould and consequently, no external seam is visible. A first class finish could be created by spray painting, but I decided to leave well alone, so what you see in the photographs is what you get. The full-size Pilatus B4 was made from aluminium and most examples have an epoxy paint finish on the surface, giving the appearance (as a colleague unkindly remarked) of an old Kit Kat tin. So maybe the finish on this model was quite authentic!

Further inspection showed the wings to be very solid with minimal torsional flex. They've also proved to be quite 'ding-resistant'. The main components fit together straightaway which gives the promise of a relatively short build time. The supplied wing joiner is made of 16mm glass and my first thought was that I would replace it with steel - mistakenly as it turned out as the glass joiner is perfectly matched to the airframe, as you will read later (or earlier if you went straight to the flying review).

Some fiddly jobs are already done such as fitting the spoilers and rudder. Geitner also installed flaps at my request and put in two servo-wells for driving each flap as they are quite long compared to the ailerons. Ailerons and flaps have a living hinge and an inside inspection showed that silicon had also been used to strengthen the hinge. There were quite large gaps between the false trailing edge of the wing and the leading edge of the flaps/ ailerons. A reel of tape was supplied to be fitted as gap wipers. No control horns were supplied, so I fabricated my own.

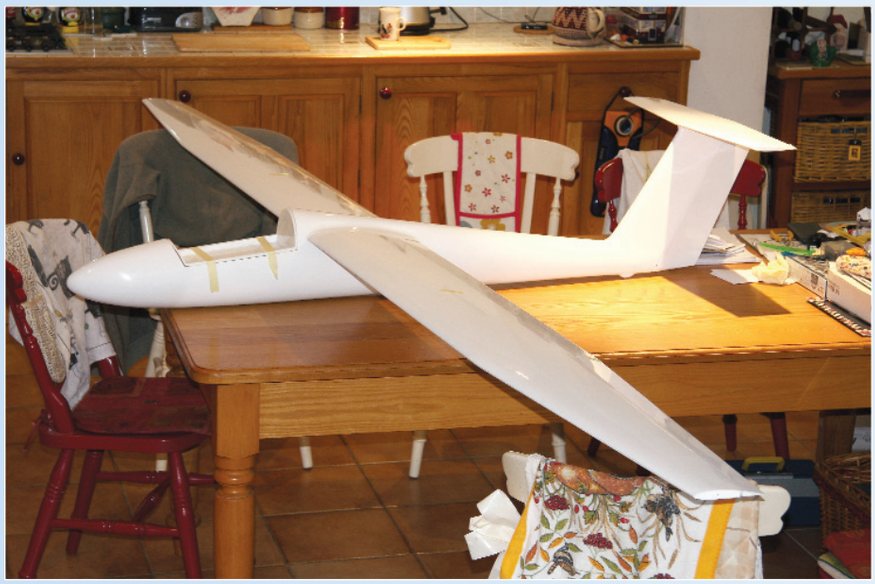
Also included with the kit were A4 sheets with brief information about trim set-up and an illustration of the proposed elevator servo installation, 'Pilatus' logo stickers, two vac-formed canopies (one is a spare) and three plastic bolts for the tail (one installed and two spares!). Again, I thought of replacing the plastic bolt with a steel one, but I still haven't got round to doing that and the plastic bolt has survived prolonged and spirited flying.

Fit Out

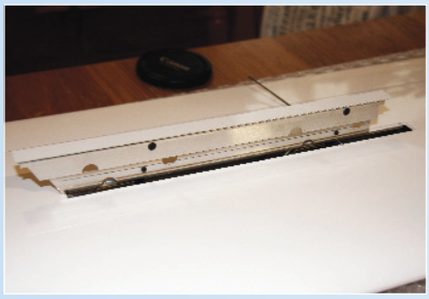
It's almost a reflex response now for me to make a cradle for each new model from polystyrene foam. It gives a stable platform for working on the fuselage and helps to provide some protection in the workshop (dining room) and when the model is being transported in the car.

I've also got into the habit of starting work at the rear end of the fuselage and then to work forwards from there. Geitner suggests mounting the elevator servo at the base of the fin post. No horn was supplied so I used a brass one and set it into the elevator using epoxy. A hole needed to be opened up at the top of the fin as an exit for the servo pushrod. Trial operation showed that the arrangement worked OK, but the geometry needed to be thought out to give adequate mechanical advantage for down elevator. I used a Multiplex Micro 'digi' servo as it fitted easily in the fin with good clearance for the servo arm. Dynamic torque of the Micro 'digi' with 6V supply was quoted at 42 Ncm. Would that be enough for my flying style? There is minimal play in the control run and good leverage for 'up' elevator, so in practice it has worked very well. Geitner suggests that pieces of sandpaper be glued to the top of the fin; there is then no need for any other locating pins for the tail plane, everything being held in place by the main plastic bolt and friction from the sandpaper.

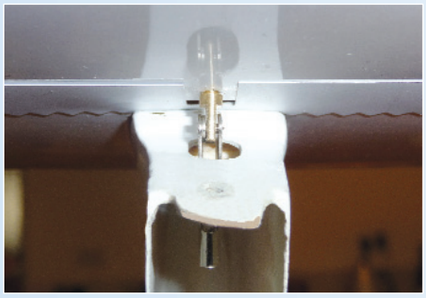
The rudder hinge was already fitted by Geitner. The rudder itself was supplied with Kevlar thread for a pull-pull control arrangement. This did not prove satisfactory as there was stretch in the thread that allowed the rudder to flutter at speed. I have subsequently replaced the Kevlar thread with steel cable and fitted 3mm brass horns on to the rudder to increase leverage. That certainly



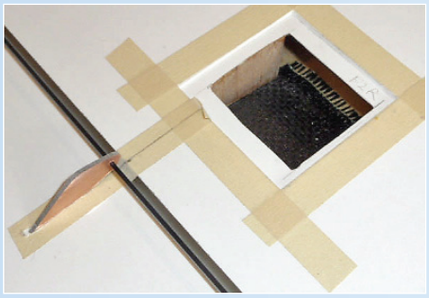
The main components can be fitted together immediately.



Airbrakes are ready installed by Geitner and work freely.



I fitted a brass horn to control the elevator.



ABOVE LEFT: *My solution for the wing servos was to fit carbon cloth into the servo wells and to bridge the skins with balsa ribs. Note that the home-made PCB horns have also been installed and a carbon rod inserted to check the alignment.* **ABOVE RIGHT:** *The wing servos were installed by floating on to a paste of epoxy resin and microballoons.*

seems to have done the job as it has not fluttered since.

Wings

First job with the wings was to open up the pre-moulded servo wells and to cut the servo covers to size. Before cutting and sanding began, I worked out the position of each servo in its well, the alignment of the pushrods to get them perpendicular to the ailerons and flap hinge lines and also where the pushrods would exit their servo cover shroud to actuate the horns. All this was sketched on to masking tape on the wing surface to minimise any chance of me making a mistake and it worked! Actually the first job was to decide what servos and horns were to be fitted, because that determined all the geometry.

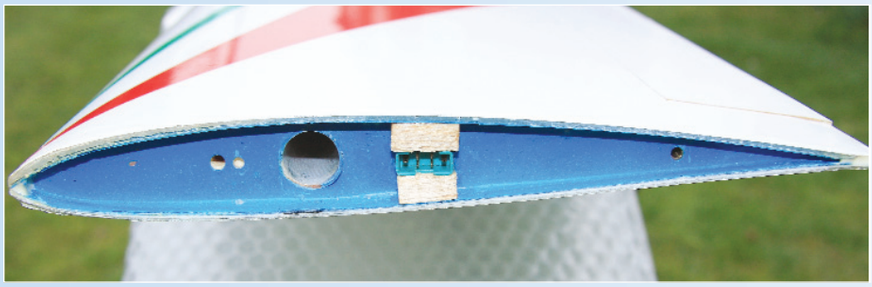
Each wing panel needed four servos to be installed (1x aileron servo, 2x flaps plus 1x spoiler per panel), so there was a fair amount of work (and cost) here. There was 19mm clear between the top and bottom wing shells, so a mini servo or smaller is required unless you want to undertake serious surgery on the servo cases. After a bit of dithering I settled on using Hyperion Atlas 16 digital servos for the aileron and flaps. These are relatively new servos, so durability has yet to be established, but they have had good 'press' so far and seem very well put together. I also went for metal gears to reduce the chance of my stripping them with ham-fisted handling. I got my servos from Robotbirds where I could have saved £6 per servo by going for plastic gears instead of metal. Each spoiler is driven by a venerable HS85 servo and I again went for metal gears.

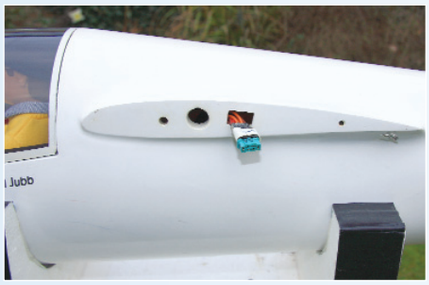
I made up the servo horns from fibreglass PCB board. The horn shape was drawn on to the board using a cardboard template and each horn was cut out using a powered fret saw and thereafter the finish sanding was done as a sandwich. Slots for the horns were opened up in the flap surfaces using a fine drill - a pin vice is an ideal tool for this. The horns were glued in place using epoxy thickened with micro fibres. A carbon rod through the two flap horns was used to keep things aligned while the glue set.

Before fitting the servos I applied some carbon cloth patches, wetted with epoxy, into the servo wells and also inserted some balsa sheet to act as a shear web rib between the top and bottom skins. The main reason I do this is to try to avoid getting ugly bulges in the top wing skins, which would otherwise result from blow back of the flaps and ailerons, but it also helps with achieving a crisp control response. I'm in favour of using servo frames in this kind of installation as they allow servos to be removed easily should it be necessary to change position of the servo arm, or for maintenance. Unfortunately I couldn't find any frames for the Atlas servos, probably because they were so new.

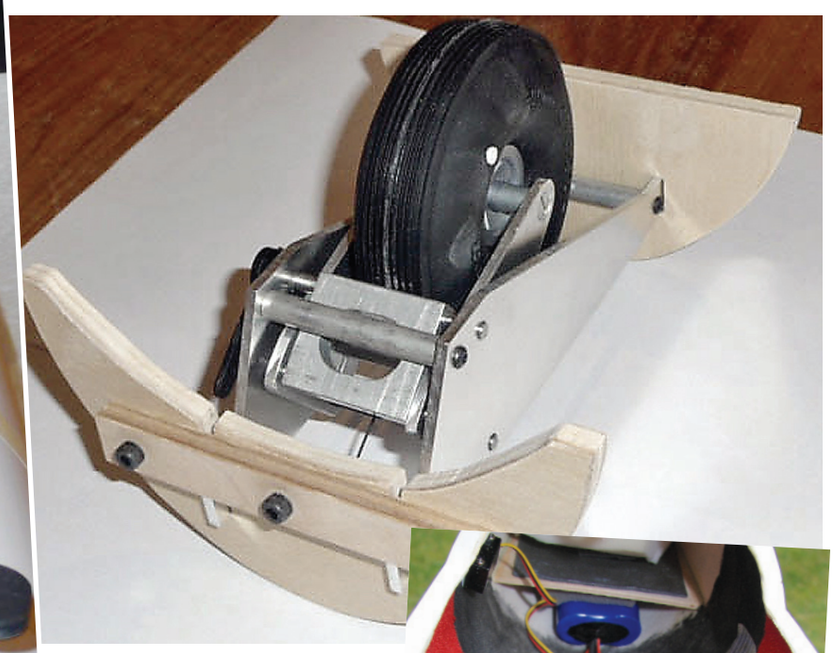
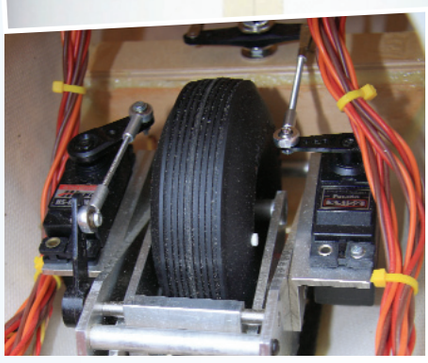
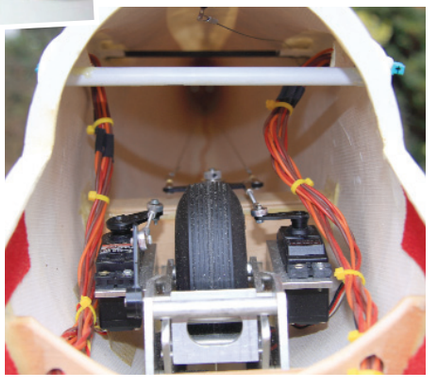
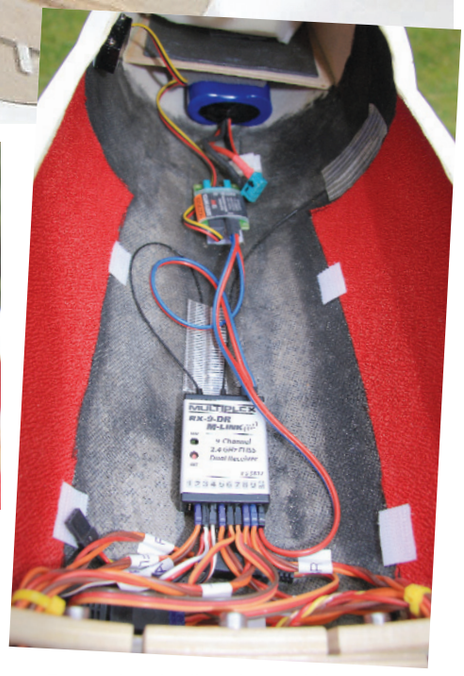
So my servos were stuck in using the 'rustic and resilient' method of gluing in with paste made by mixing epoxy resin with micro balloons. The paste is lighter than using resin alone. I also sealed the servo with heat-shrink sleeving first as that gives a fighting chance of being able to remove it should I need to later. To get a tidy and tight seal, I removed the servo lugs and cut a slot for the servo wire before shrinking. To prevent the sleeve from trying to shrink into a random shape I clamped everything in place between the jaws of a vice or workbench while it was initially applied, and then to final shrink out from the clamp. I also roughened up the shiny heat shrink using glass paper (or Permagrit file) to provide a key for the epoxy paste to adhere to.

Pushrods were made up from 2.5mm threaded rod, which I've found to be ideal for sailplanes up to the size of this Pilatus. Not everyone stocks this rod and most model shops seem to assume that modellers should be using either 2mm or 3mm. I got my latest batch of 2.5mm rod from ebay. Servo centre and travel was all trialled and clevices were tacked into place using 'Threadlock'. This seems to have removed any play in the





ABOVE LEFT: *Wing root detail showing the servo wiring socket is permanently fixed in place.* **ABOVE RIGHT:** *Multiplex green plugs were left on a fly lead. You can also see the cable release for the canopy which exits below the wing root.*

TOP LEFT: *Formers were made up to support the retract unit.* **TOP RIGHT:** *Retract doors were cut out using a craft knife.* **ABOVE LEFT:** *The rudder servo is mounted on the retract unit and the rudder pull-pull mechanism is supported on the retract former.* **ABOVE RIGHT:** *More detail of the retract unit. You can also see the bracing rod at the leading edge of the wing root and the canopy release cable.* **RIGHT:** *I made a compartment for the receiver battery which also supports the nose ballast.*

pushrod thread, but if any does appear I will wick solder in between the rod and clevice. Once I was happy that all was working OK and the rods were the correct length, the epoxy paste was mixed and spread on to the now dry carbon cloth patches and the servos lowered on to this to create their own bowl.

Each flap is driven by two servos, so I used the following procedure to match the movements and reduce the chances that the servos would work against each other. The inboard servo was set up and glued in as described above. When the glue was set the pushrod assembly was removed and an identical pushrod assembly made up for the outboard servo. The outboard flap servo was then installed using the same method as the inboard servo. Operation of each servo was tested independently with the flap connected and the other servo running free. A final check was made to ensure that the servo arms were working in unison by running a carbon rod between the servo arms and operating them as a gang (either using a y-lead, or with each channel having identical settings for centre, travel end points and volume. Once this checked out OK, the pushrod assembly for both servos could be attached to the horns for testing of the ganged servo drive. I guess it worked out OK as there has been no 'buzzing' to indicate any resistance. I'm sure I could use a more high-tech solution for matching the servo movements and for load testing, but my crude method has worked out OK.

The flaps were set to work with a neutral centre, because I wanted to be able to couple them with the ailerons and I didn't need to set up large downward deflection for crow braking as the wings have spoiler brakes.

Front End

A retractable wheel is very handy for aero tow, but as my flying is almost exclusively at slope sites, you might wonder why I decided to fit a retract unit. My rationale was that it would provide some ballast to help bring the wing section on step and help with resale value if I ever decide to move the model on. I managed to get my retract unit from an old contact - Neil at Spire Models in Salisbury. When positioning the unit in the fuselage, the wheel needs to be in front of the CG, but not so far forward that the unit encroaches into the cockpit. So I did some maths and measurements to check the size of the aperture that needed to be made in the fuselage and marked that up using masking tape. Cuts were made using a knife rather than a Dremel, to keep the gaps between the fuselage and doors as neat as possible. I also decided to mount the rudder servo on the chassis of the retract unit and to incorporate a bell crank for the rudder closed loop into the formers for the chassis. Hopefully the pictures will help to explain the arrangement. After all this effort the retract doors were taped up to avoid any chance of snagging during a landing at the slope!

By ganging the flaps I was able to get away with a 9-channel receiver (three channels per wing, two for the tail and one for the retract unit). The latest generation of 2.4GHz receivers will cope with a higher voltage than 35MHz receivers, so I have settled on using 2S LIFE battery packs to power the on-board radio control equipment. The voltage is well within operating range for the receiver and is below that of a freshly charged 5-cell nickel pack, so the servos I used can cope without the need for voltage regulation. The larger LIFE cells have plenty of capacity for a full day's flying so I also decided to avoid the complication of twin packs and a battery backer unit. I did want the convenience of a switch so I wouldn't have to clear out the cockpit at the beginning and end of each flight. Multiplex has a new range of 'safety' switches and the 12HV unit seemed ideal for my application as it had a healthy 12 amp current capacity without a direct mechanical link between the battery and receiver.

The instrument panel was fitted directly on to the canopy frame. When the canopy was removed it allowed good access into the front of the fuselage for tweaking the nose ballast and for charging the battery. I made the panel by laminating two thin pieces of ply and recessing printed dials on to the back piece. Closed-loop cable was fitted to the canopy latch and exits the fuselage below the wing root - so the canopy release mechanism is well hidden when the model is rigged.

Nicely controlled landing approaches are easy to achieve due to the combination of flaps and spoilers.

Decoration

I quite like a sailplane that is coloured plain old appliance white and was more than content to campaign my Pilatus with minimalist markings, until I was eventually shamed by some of the great and the good of our hobby into adding decoration. The starburst scheme shown in the photographs was simply applied using coloured vinyl. I also invented some personalised registration markings, so my Pilatus is not based on a full size subject and not likely to win favour at the local scale meeting, but I'm quite sure that with a bit of research, any modeller with more patience than me could indeed turn their Geitner Pilatus into a prize winner.

The Flying Bit

The maiden flight was so free from drama that I cannot remember much, other than it took place on a beautiful and warm summer evening. It was one of those perfect moments when the wind was light and the lift was extensive. The Pilatus was able to hug the contours of the slope and to fly as far as I could see. That really seems to have cast the die and most of my flights with the Pilatus since then have left me with a rosy feeing.

I hope that the photographs convey some of the wonderful character of this model. You see, it seems to have multiple personalities. One moment it's a stubby aerobat, the next it's an elegant high aspect ratio alpine soarer and then the very next moment it's a classic standard class racing sailplane. That's certainly the visual impression that it gives depending on which face it's showing, but it also reflects the broad range of flying qualities.

Geitner has made an airframe with a well balanced mix of stiffness and flex. The wings can be loaded and unloaded during a loop in a most satisfactory way, with what looks to be an elliptical distribution of flex across the span and it's likely that the glass joiner plays its part in this. There's never a feeling that the flex is going to lead to softening of the controls, or that the airframe will fail and so the model can be happily flown with

Retractable wheel unit is optimally located to be forward of the CG while still allowing space for the pilot.

I shaped a dashboard from polystyrene foam and the instruments were mounted on thin ply.

The cockpit is reasonably convincing with only minimal effort on detailing.

Key Dimensions and Surface Movements

Scale 1:4, Span 3.75m, Aspect ratio 1:17.6, Length 1.64m, Wing profile HN950, 10.5% max thickness.

These are the movements that I have set up, but I rarely use all the available movement. Aileron, rudder and elevator movements were measured at the tip. Flap movements were measured at the root.

Elevator:	+11 / -8 mm (+ up, - down)
- spoiler compensation	0 mm
Rudder:	+50 / 50-mm
Aileron:	+10 / -8 mm
- spoiler	0 mm
- thermal flap	-2 mm
Flap:	
- aileron mix	+11 / -5 mm
- spoiler	-5 mm
- thermal flap	-4 mm
- snap flap	-3 mm
Centre of mass:	95 mm from the leading edge at the wing root.
Longitudinal dihedral:	1 degree
All up flying weight:	5.85kg (12lb 10oz)

Resources

Geitner:	http://www.flugmodellbau-geitner.com
Robotbirds	http://robotbirds.com
Multiplex RC	http://www.multiplex-rc.de
Spire Models	01722 415541

some abandon. The flexible nature is also of benefit when landing at the slope - any shock loads seem to dissipate through the airframe to cushion each landing. The additional weight with the retract unit has also worked out just right for my flying style; the model always seems to be able to penetrate into wind, yet flying speed seems to be easy to control. I have not felt tempted to use the steel joiner for additional ballast, but it might have been handy if the retract unit had been omitted.

The optional flaps have definitely proved their worth. Roll rate with aileron only feels a bit sluggish, so I almost always fly with the flaps coupled in. The flaps are relatively large, so it's important to set up asymmetric movements in order to minimise adverse yaw. I've also programmed in a touch of flap to help control speed when using spoiler brakes and that's resulted in a nicely behaved model throughout landing approaches and touch down.

This model is an excellent all-rounder, but is never going to be able to compete at the extreme end of aerobatics with a specialist glider such as the Swift. Axial rolls require elevator and rudder movements to be co-ordinated with the aileron, which may be a result of the Pilatus having a high-mounted main wing and high-mounted tail plane. It usually takes me a few moments to adjust after flying a sport model, but it is very rewarding on standard aerobatic figures. Inverted flight is easy to hold in good lift without losing too much momentum. The CG is just right for my flying style, but it might be a little rearward because the model feels like it wants to tuck when starting down from a stall turn. That could also be due to the pendulum effect with a T-tail, but in any event it's easy to correct once you're ready for it.

I've already had a lot of fun and I'm going to have a lot more flying time with this model. The fuselage shape makes it easy to grip so there's no problem launching it by myself at any slope and in any wind strength. It's a convenient size to have in the car and for carrying. Geitner has managed to produce a very nicely balanced all-round sailplane with rewarding and forgiving characteristics which makes it perfect for everyday flying. It may not have the 'bling' of some and there may be stiffer, bigger and sexier versions of the Pilatus B4 out there, but I wouldn't want to swap. Now what else has Geitner got in that catalogue... ■

The proud owner wouldn't want to swap this with other versions of the Pilatus B4.