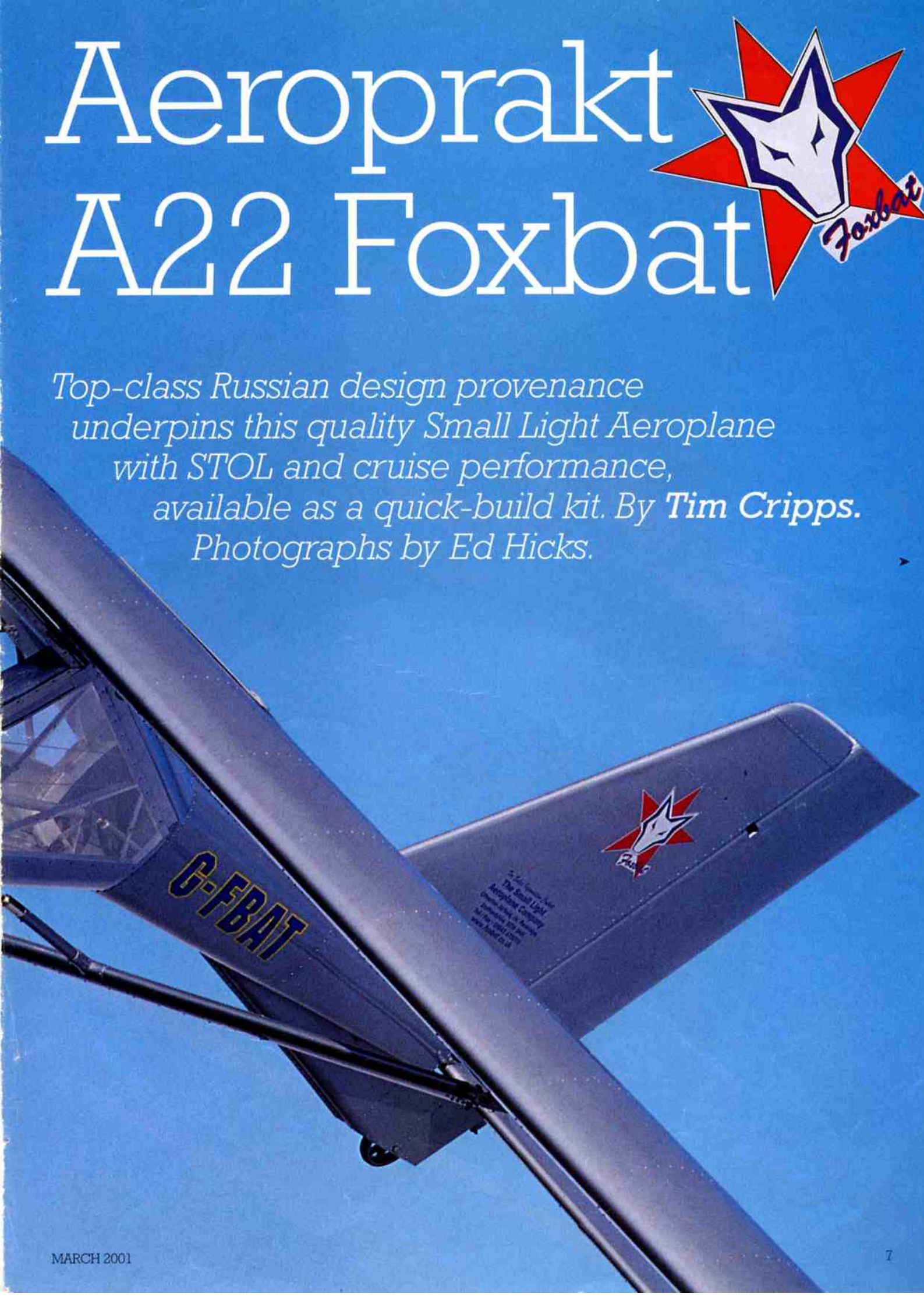
Aeroprakt A22 Foxbat

Top-class Russian design provenance underpins this quality Small Light Aeroplane with STOL and cruise performance, available as a quick-build kit. By ***Tim Cripps.*** *Photographs by Ed Hicks.*



WHAT HAVE MASSIVE transport planes in common with microlights? The answer lies in Antonov's huge and top-class design department which included a keen microlight pilot, Yuri Yakovlev. In 1986, Yuri founded the highly successful Antonov's Amateur-design and Flying Club. In 1992, he branched out to form a separate company called Aeroprakt, employing a strong team of ex-Antonov designers.

The company's first product was the internationally acclaimed A20. This encouraged Yuri to compete in the growing European 450 kg Ultralight market, with a quality engineered conventional design, the A22. First produced in 1996 as the 'Shark', this design is now known in the UK as the Foxbat and is undergoing flight trials for PFA approval as a Small Light Aeroplane (SLA). It has already satisfied the stringent German BFU95 requirements and is selling in the USA as the A22 Valor.

The Foxbat is being imported by the Small Light Aeroplane Company Ltd, which is run by Gordon Faulkner, a microlight instructor/examiner and BMAA inspector and check pilot. The project's technical consultant for liaison with PFA Engineering is Ray Everitt, a qualified engineer, who is also a microlight instructor/examiner (FIC), BMAA/PFA inspector and test pilot.

With its 500-mile range and potential 100 mph cruise, the Foxbat can claim to be a genuine touring aircraft; it can also operate safely from any 200-metre microlight strip because of its 100 hp engine and outstanding STOL capability.

It has a roomy and comfortable side-by-side cockpit with big windows and ample space for baggage. Its construction is commercial standard light alloy and fabric, offered in kit form for straightforward DIY assembly.

The wing section has been developed by Oleg Antonov himself; it combines an exceptionally good lift to drag ratio with high lift at low Reynolds numbers. This and the full-span flaperons largely account for the Foxbat's outstanding STOL capability and respectable cruising performance.

The wings are slightly swept forward for reasons to do with both the C of G position and other, aerodynamic, benefits. This, in combination with a well-raked windscreen extending into the wing carry-through section, aids the pilot's view upward and into turns. The main spar is of conventional D-box and drag spar construction, with pressed ribs, all made from Alclad aluminium. Torque tubes operate the flaperons, which have two droop settings of 10° and 20° and are readily lowered by an overhead lever. The roll control linkage is arranged to give a significant amount of differential effect, and there is a ¾ inch slot between the flaperon leading edge and the wing. The wings have at least 1° of wash-out.

Each wing comes with a composite 37.5 litre fuel tank already fitted. The filler caps are on the top of each wing-root and most people will need a step to reach them.

Two separate cocks, mounted in the wing-roots, allow either or both tanks to be selected. (Non-return valves to prevent cross-feeding may be fitted if found to be necessary.) A gascolator/water drain is reachable underneath the engine cowling.

The connections for the flaperons incorpo-

Above right: **the wing construction is a conventional D-box, with pressed Alclad ribs. To minimise adverse yaw, the flaperons have a differential action.**

Right: **there are plans to raise the panel, which is currently set too low for tall pilots.**

rate foolproof quick-release fittings, and the fuel lines also can easily be fitted with QD connectors, making it a fairly simple matter for two people to remove the wings in half an hour or so, for trailing. A wing-folding option should also be available later.

The fin and tailplane are made using the riveted main spar and ribs method and come completely skinned in aluminium sheet. The rudder and elevator employ the same D-box and rib construction as the wing, and only require covering and mounting. Interestingly, the power of the elevator and proximity of the C of G to the main wheels make it possible to wheelie the Foxbat from a standing start, like a motor-cross bike powering out of the start gate—something you can also do with the Tecnam Echo. A small tailwheel is fitted for this reason.

The elevator has a powerful electric trim tab, operated by two buttons on the stick, and monitored via a neat LED indicator on the panel. Pitch control is via bell cranks and sturdy push-pull rods thoroughly supported in rollers. The rudder pedals, which hinge from the floor, are connected to the nose strut via short internal rods, and to the rudder via stout cables. The nosewheel steering has no self-centring springs but you would not notice this

panel mounting to raise the panel several inches. This will in no way restrict the forward view, because it will merely bring the top of the panel more in line with the cowling.

The gull-wing doors are piano-hinged at the top and can easily be removed for photography or hot weather flying. Both are held open by a gas strut, which over-centres as the door is pulled down and helps push it to the closed position. Both doors are fitted with a neat latch (non-lockable), which can be operated from inside and out. Access is exceptionally good and the doors fit well. An adjustable air vent is mounted in the dished Lexan and cockpit heating can be fitted quite easily.

The ample instrument panel is somewhat unusual in that it ends seven inches short of the slim cockpit door pillars, further enhancing the excellent view forward. The doors are fully glazed, bulge by three to four inches, and extend right down to the floor pan, offering a tremendous field of view down, forward and to the side. As if that was not enough, a large part of the fuselage sides and top, aft of the seats, is also glazed, giving an amazing view rearward, and making the body of the plane extraordinarily transparent. It will always be easy to identify a Foxbat!

***Top:* the fuel filler caps are mounted above each wing-root.**

***Above left:* free use of Lexan glazing makes for an airy fuselage. Note the built-in nylon, zipped 'suitcase' for luggage.**

***Above:* 'an amazing view rearward'. The control runs are there for all to see.**

***Left:* engine installation is compact, but access for servicing is still good.**

while taxying, which is as easy as you could wish.

The fuselage is an aluminium monocoque and comes ready-built, with only the floor and various brackets left for the builder to secure. The cockpit is really exceptionally spacious, being fifty inches across at the widest part of the bulged Lexan doors. The semi-reclining seats are well-shaped for comfort and have energy-absorbing foam beneath the cushions. Height from the seat squab to the cockpit roof is an ample 38½ inches, so there is plenty of headroom.

Seat adjustment is limited to varying the layers of cushioning and unfortunately, seems to be insufficient for very tall pilots i.e. over 6 ft 4 in, whose bent legs bring shin and instrument panel into conflict. Aeroprakt is now aware of this problem and believes it can fix it simply by cutting back and tilting some of the

A nylon fabric, zipped 'suitcase' for luggage is mounted behind the seats, convenient to reach in flight. The alloy and stainless steel firewall has no fibre soundproofing, but I found the noise-level perfectly acceptable while using good passive noise-attenuating headsets.

Weight dilemma

The UK demonstrator has basic VFR instruments plus the Flydat digital engine monitoring system and an extra analogue tachometer, but this is a matter of customer choice, as is the position of the brake-lever and the option of having one central control stick or two separate ones. G-FBAT has one motorcycle-type brake-lever somewhat awkwardly mounted on the central stick. For the training role, I think I would prefer to have two linked levers, outboard of each seat, alongside the throttles.

The throttles proved very convenient and easy to use, though you do need to be careful not to knock them when getting in or out of your seat, especially if the engine is running! There is a fuel gauge for each tank, with a low-fuel warning light, and the sender unit comes already installed in the tank. G-FBAT also has an Elba flow-meter. Except for the parking brake valve, which is beneath the first pilot's thighs, all the controls and instruments are reasonably accessible to both pilots; an extra slip indicator has been thoughtfully placed in front of the right-seat pilot.

The undercarriage is conventional and sim- ➤

ilar to a C152. The noseleg has a telescopic strut with laminated fibreglass leaf-spring/scissor-link. The slim main legs are of hardened spring steel and are fitted with sturdy Matco five-inch wheels (the spats will accommodate six-inch), each with substantial hydraulic disc brakes. The combination is clearly designed for short field operation and the ride on rough grass was very good. The elegant composite spats weigh little more than 2 kg, and can be fitted without exceeding the weight limit—but see my later comments.

The engine is the 100 hp Rotax 912 ULS, and in G-FBAT it is fitted with a two-bladed Italian GT Tonini propeller of 180 cm diameter and 135 mm (fine) pitch. This gives outstanding STOL and climb performance, but limits the cruise to 95.4 mph. The propeller is driven through the standard 2.43:1 reduction gear box. Propeller ground clearance is a healthy 8½ inches.

Right: **in the air, the Foxbat is pleasant, once you get used to the unusual control harmonisation—the light rudder lacks 'feel' and doesn't always self-centre.**

The cowling is made of composites and detaches fairly readily into upper and lower halves, by releasing four Dzus fasteners for the top half, and four machine screws for the bottom. The installation is compact but access for servicing is good.

As our CAA are well aware, their application of the 450 kg limit (to include two 86 kg pilots and one hour's fuel at max continuous), poses crucial difficulties for most SLAs. The fuel allowance varies slightly depending on the engine, but for the Rotax 912 ULS it is a non-negotiable 12.5 kg. Add this to two British pilots (Germans and others are deemed to weight only 70 kg) and subtract the result (184.5 kg) from 450, and you are left with 265.5 kg. This, curiously enough, is only a kilogram or so over the claimed empty weight of the Foxbat and most other SLAs.

It doesn't take a genius to realise that this leaves the pilot with a dilemma or, more accurately, a 'trilemma' i.e. lose crew weight, perhaps by dieting; accept a range limit of ninety miles; or fly overloaded. Let me explain. Unless the pilot and crew weigh less than 172 kg together (that's 25 stone to most of us), they are officially restricted to one hour's fuel and no baggage—not even a GPS or radio. If they are bantamweights, they may choose to offset their lesser weight with fuel and/or baggage. However, if they are heavier, they may not fly at all!

Gordon reckons he could have saved up to 5 kg by using a conventional evaporating paint scheme, rather than a two-pack polyurethane paint. You could also save 2 kg by removing the spats. What would be the point of such weight-saving measures? Well, they would officially permit you to uplift an extra 7 kg of fuel (at the most another hour's flying). Big deal? It's hardly worth the hassle. Of course, the only thing that really matters is that the Foxbat can indeed meet the British SLA weight limits. I merely call your attention to its 75-litre fuel capacity and the fact that it has been regularly flown at 550 kg, with little loss of performance, and leave you to draw your own conclusions.

In view of the weight restraints, it may seem superfluous to mention the Foxbat's baggage

bay! It is notable that, because of its position on the back of the seats and its size, it would theoretically be possible (though illegal) to put 68 kg of baggage in it without exceeding the aft C of G limit. Indeed, the proximity of both the fuel and the pilots to the C of G ensures that C of G problems should never arise.

On the ground, because of its balance, it is particularly easy to turn the Foxbat simply by lifting the nose with just one hand under the propeller. Similarly, it is easy to protect the nosewheel on rough ground with a little up-elevator. Taxying is utterly straightforward, with good springing, braking, turn radius, and pleasantly direct nosewheel steering.

The take-off is where you first appreciate the microlight nature of the Foxbat—'homesick angel' is an apt description. The 100 hp provides exhilarating acceleration, with plenty of slipstream for rock-steady steering and finger-tip elevator control. You can hold the nosewheel clear of the grass virtually from the start, and at about 40 mph she flies herself off and almost immediately reaches 55 mph, at which you adopt an impressively steep climb angle.

The ground-roll was genuinely under eighty metres, using 10° of flaperon, and helped by a five mph headwind. I was being cautious and I've no doubt you could do 15 to 20 per cent better with practice. If you are accustomed to conventional trainer or similar performance, I assure you this remarkable STOL capability will amaze you. Foxbat owners will enjoy a wonderful freedom to operate from innumerable unprepared fields.

The climb too was impressive and settled at 1,250 to 1,300 fpm at 65 to 70 mph—which left our C152 photo plane hopelessly struggling to catch us—we levelled off above the clouds at 6,500 feet before he reached 4,000. The climb angle was too steep to allow much view directly over the nose but the forward and downward view through the bulged Lexan doors is so outstanding that it more

than compensated. In fact, by leaning into the bulge, you can see almost vertically beneath the plane, and the slightest bank would allow you to inspect a ground feature with the greatest of ease.

Unusual though pleasant

The potential 100 mph cruise needs qualifying. If you firewall the throttle, you might indeed achieve 100 mph, but that would not be the normal cruising speed for this aircraft. It is largely a question of economy, engine handling and manoeuvring speed. At economy, 75 per cent power, say 4,800 rpm, you can expect to cruise at about 85 mph, and you could be even more economical at about 4,400 rpm and 70 mph. (Our GPS couldn't pick up enough satellites to give us a ground-speed reference, so I cannot be more precise.) I did think that a respectable 85 mph felt thoroughly comfortable and appropriate, bearing in mind that the wing has a relatively low fineness ratio of just under 7:1 (eight-inch thickness and 55-inch chord). At this speed, the indicated fuel flow was about 15 lph, though Gordon reckoned the Elba flow-meter was over-reading by up to fifteen per cent.

The control harmonisation is a little unusual, though pleasant enough. The elevators seem ideal and the electric trimmer is effective and sufficiently powerful for all but the bottom 15 mph of the speed range (quite normal). The flaperons feel rather heavy at first, but you soon get used to them, and the 30° to 30° roll-rate timing varies from two seconds at cruise to 4.5 at approach speed with full flaperons—comfortably satisfying BCAR 'S'. Mild adverse aileron yaw was noticeable, particularly with full flaperon selected, but I'd rate it as a positive training feature, which normal rudder co-ordination would remedy.

The rudders were the odd one out and felt decidedly light and lacking in feel, though the break-out force and friction in the nosewheel undoubtedly affected this. I measured this on the ground as about 10 lb, which would be barely noticeable were it not for the very light aerodynamic forces generated by the rudder. This does give rise to a potential problem, in that the rudder will not always self-centre as it should. Also, I was very conscious of a need to apply significant right rudder most of the time, particularly under high power in the climb. I am almost certain this is a minor development problem rather than a fundamental deficiency—a length of shock cord attached to the rudder circuit will probably fix it. At the very least, it would ensure that the light rudder forces increased more perceptibly with displacement, as the regulations require. But I must stress that the rudder is really not difficult to use in any stage of flight. For instance, you can raise a wing with rudder, and perform well-controlled side-slips. In short, you would quickly get used to it.

Another fix would be to move the long nosewheel spat a few inches aft to increase its tendency to weathercock the noseleg straight.

In the air, the longitudinal stabilities proved to be entirely healthy and the stick forces were pleasant and largely trimmable. The trim changes with power and flaperon were mild and in the correct sense.

While many SLAs are frankly stretching the rules to satisfy the minimum speed requirement of 39 mph, the Foxbat satisfies them with plenty to spare. Its slow speed performance is truly remarkable.

I first tried a level flight, clean stall, and experienced classic docile behaviour, with positive three axis control right down to the break, which came at about 37 mph after a brief warning of mild buffet. The same thing with full flaperon gave similar results, but at a very steep nose-up attitude and an amazing IAS of only 28 mph. Even allowing for some pitot error at this high incidence, it felt slow enough for this speed to be almost plausible. In all cases the flaperons, no doubt assisted by their almost Fowler-like slot, continued to give roll control right down to the break, and thereafter, as soon as I eased the stick forward. There was a small wing-drop, increasing to 30° with full flaperon and power for level flight, and to 45° to 50° with climbing power (extremely steep attitude), but in all cases normal recovery action was immediately effective and height loss never exceeded 100 feet.

Though it was generally the left wing that dropped in level flight stalls, it was a relief to find that, in turning flight the Foxbat tended always to roll towards wings level, rather than tucking under. In summary, you could describe the stalling behaviour as good and highly suitable for a training role.

To get down from the cloud tops, I tried a dive to V_{ne} (122 mph). It was a complete non-event and rapid control inputs all met with ➤

Aeroprakt A22 Foxbat

Manufacturer's data

Dimensions	
Wing span	10 m
Wing area	13.7 sq m
Aspect ratio	7:1
Length	6.3 m
Height	2.4 m
Height, tail	1.9m
Tailplane span	2.9 m
Wheel track	1.8 m
Weights and loadings	
Design mtow (+4/-2g)	450 kg
Empty weight	264 kg
Fuel	75 l
Performance	
Rate of climb	1,200 fpm
Cruise @ 75%	85 mph
Stall with flap	33 mph
V_{ne}	122 mph
Design diving speed	135 mph
Service ceiling	15,000 ft
Take-off to 50 ft	150 m
Landing roll	60 m

Engine options: 100 hp Rotax 912 ULS.
Propeller: Tonini two-blade 180 cm x 135 mm.

Manufacturer: Aeroprakt

Importer: The Small Light Aeroplane Company Ltd, Otherton Airfield, Penkridge, Staffordshire ST19 5NX. Tel/fax: 01543 673075, web: *www.foxbat.co.uk*

Price: about £30,000 plus VAT. (See pg 12.)

near dead-beat response and not the slightest sign of flutter. Gordon hadn't established a best gliding speed, so we experimented briefly and found about 600 fpm at 65 mph reducing to a minimum sink rate of about 350 fpm at 55 mph, i.e. roughly 14:1, which is very creditable and indicative of a clean and efficient design.

Gordon demonstrated an impressively short landing on Shobdon's south-side grass strip, which is 300 metres long. With use of aerodynamic braking only, we stopped in about half the strip. He advocated approaching at 55 mph, slowing to 40 mph across the threshold and had no difficulty in holding a steady 4° to 5° glideslope. I attempted to do the same, though it did seem unhealthily slow. With a little side-slip, I flew a 6° approach initially and found the speed control to be straightforward, but we evidently hit a fairly violent wind shear and rotor from the nearby poplar trees just as I cut the power. The result was a barely controlled one-wheel drop-on with 10° to 15° of bank downwind. To the Foxbat's great credit, the well-sprung main gear made it all feel quite soft and we rolled out with no difficulty.

I am sure that, with practice, you can put the Foxbat down absolutely on the numbers, but I chose to increase my margins to more like 60 and 50 mph on the next approach to the less turbulent north-side grass. I'm happy to report that honour was restored! The Foxbat is really a joy to land. In fact, I really envy all those owners who can have such fun popping into any number of friendly little fields. The freedoms of microlighting have at last been combined with comfortable cruising.

I liked the Foxbat very much and would personally choose it in preference to all the other SLAs I've flown. That is essentially because I'd value its exceptional STOL capability much more than I'd value the ability to cruise a bit faster, like some of its rivals. Actually, it may be possible to compromise to some extent by fitting a prop with a coarser pitch, but I'd be happy with the Tonini, which is clearly optimised for take-off and climb.

As to the various niggles, it is still relatively early days in the progress of the Foxbat toward full PFA approval. It is not much more than six months since the pieces were unpacked from the crate and the plane has flown only a few hours. Once Gordon and Ray have applied their able minds to a few refinements and PFA Engineering has finished with it, scheduled for Spring this year, I predict this highly attractive kit plane will have a long waiting list of eager buyers.

Undoubtedly the Foxbat is a very enjoyable touring aircraft and positively invites you to go places. The almost helicopter-like sightseeing potential, the entirely relaxing handling and the comfort of the semi-reclined seats, all combine to make you feel completely at home.

It is a thoroughly well-engineered and attractive plane. It offers everything a C152 or similar can offer, along with so much more in STOL, all-round performance and operating economies—all the freedoms associated with a Small Light Aeroplane. ✝

Easy to build

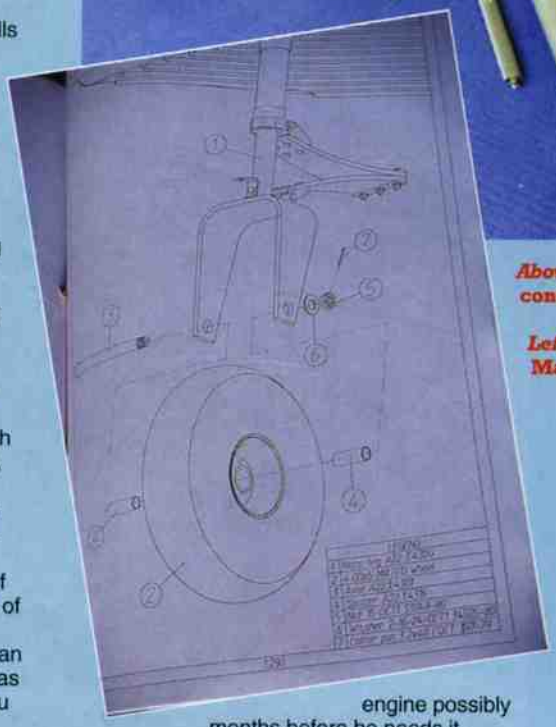
I AM CONVINCED that many would-be buyers of PFA/BMAA kit planes see the building process as demanding more time than they could ever afford and/or more skills than they could ever muster. Until now, and with widespread knowledge of the experiences of, for instance, Europa builders, such a pessimistic assessment has been well justified. But all that is about to change.

On the question of time, Foxbat buyers will be glad to learn that Gordon and Ray built the UK demonstrator, at Chirk airfield, in just three months—mostly spare time work while running their busy flying schools.

Equally, on the skills side, I assure you the process is much more akin to Meccano assembly than to traditional aircraft fabrication—anyone with average DIY skills should find it straightforward and enjoyable. In case you say, "I've heard that one before!" let me give you a few reassuring details.

The kit consists mostly of prefabricated Alclad aluminium parts. All major components, i.e. the fuselage, wings, tailplane, fin and all control surfaces come pre-riveted. The remaining riveting is confined to final fitting of the cockpit floor—which is pre-drilled and Clico'd in place—and securing the fin and various mounting brackets to the bare fuselage shell. Most rivet holes are pre-drilled, deburred, and even Clico'd where possible. All rivets are pretreated with an anti-corrosion plating and are supplied with the kit, as are all the other fasteners, nuts, bolts and even split pins. The wings and control surfaces require covering, but that really is a simple task these days—no rib-stitching, just glue.

The rest of the work is pure assembly of very well-finished and plated components of commercial aviation quality, e.g. at every point where a rotating action takes place, an aerospace-quality rose-joint or ball-race has been pressed into the bracket. Indeed, you get the impression that this aircraft is if anything 'over-built' to full commercial airliner standards. I was equally impressed by the comprehensive Build Manual with its 66 exploded illustrations that cover each step of the assembly process, together with easy-to-follow text (which is being translated and Anglicised). Another encouraging feature of the Foxbat kit is that it can be purchased in stages, saving the builder paying for his engine possibly months before he needs it.



***Above:* the fuselage, wings, tailplane, fin and all control surfaces come pre-riveted.**

***Left:* a page from the comprehensive Build Manual.**

As to costs, the builder has quite a choice in the equipment he can fit, e.g. instruments and covering system/paint, and, if you fancy a 4,000-mile round trip to Kiev, you could save yourself some of the £1,950 delivery charge. However, if you include that figure, and add the Rotax engine, Matco wheels and other off-the-shelf Western items, you will find the total bill will be about £30,000 (including around £4,000 VAT). In case you think that sounds quite expensive, I assure you that a similar airframe finished to the same high standard in the West would cost considerably more.

The Russians have clearly calculated their market, and I reckon this price makes the Foxbat squarely competitive with other SLAs and particularly attractive if you value the STOL capability, as many flyers should. One look at the UK ICAO charts and a cross check with *Lockyears* farm strips guide should convince you that the ability to operate safely out of 200-metre strips is a priceless asset. After all, what is the point of having a go-places aeroplane if the only places you can go are airports miles from the friends you want to visit?

On a final note of encouragement, Gordon assures me the assembly can be carried out in any reasonably large garage. So, banish those doubts and fears! You surely can build your own Foxbat, and I'll bet you will find it almost as satisfying to build as to fly!