



METAL-FAX LIMITED

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CAA APPROVED AI AIRCRAFT MANUFACTURER - DAI/8919/84

Dear Mr Shawan,

We have pleasure in enclosing details of our exciting SHADOW SERIES B - MK I aircraft which has created so much interest and favourable comment. It is the first two-seat, 3 axis microlight in the world to be granted full 'Type Approval' by the UK Civil Aviation Authority in May, 1985.

The SHADOW is significantly different from most other microlight aircraft available today. It has been professionally designed to be an aircraft, in the true sense of the word, falling within the microlight category so retaining all of the concessions afforded to this type. By careful development over a two year period and by the use of advanced materials/construction techniques, the SHADOW has emerged as a definite innovation in the world of light aviation.

As the owner of a SHADOW you will enjoy the outstanding performance and precise control of a refined aircraft at an operational cost which is well within the reach of the average enthusiast. In addition, you may be in a position to consider more practical uses of your machine, in particular, aerial surveillance, photography, crop spraying and float flying. In 1985 a SHADOW came 4th overall in the World Championships at MILLAU in France (it was also classed as both the fastest and the slowest aircraft in the competition) and two more took 1st and 2nd places in the Norwich Air Race; one of these was carrying a passenger and the other was an aircraft straight off the production line!

Although primarily designed as a two-seat or load carrying aircraft the SHADOW also offers exhilarating solo flying. Here then, at last, is a low cost and durable aircraft with not only superb sports flying, but the potential to fulfil a variety of practical roles, bringing an entirely new dimension to the realm of inexpensive private flying. We can also provide a superb custom built trailer which doubles as both hangar and transporter.

This remarkable aeroplane is now available with Dual Controls - providing the opportunity, at last, to train for your PPL Group 'D' on a 3 axis aircraft.

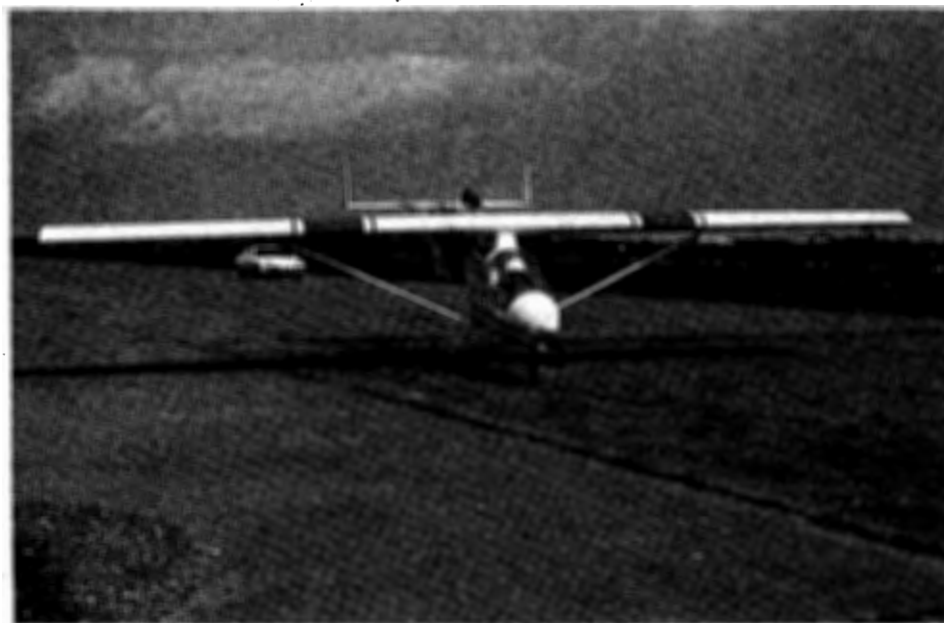
To complement the Factory built SHADOW, the aeroplane is also available in kit form - details of this are contained in the Kit Information Pack. This version also includes the Dual Controls as an optional extra.

We look forward to welcoming you to the ever increasing number of international enthusiasts. There are SHADOWS currently flying in the UK, NORWAY, FRANCE, PORTUGAL, YEMEN, AUSTRALIA, INDIA and in the near future KENYA - with numerous kit versions under construction as far afield as NEW ZEALAND.

Yours sincerely,

T.M. Plewman
Director

SHADOW MICROLIGHT AIRCRAFT

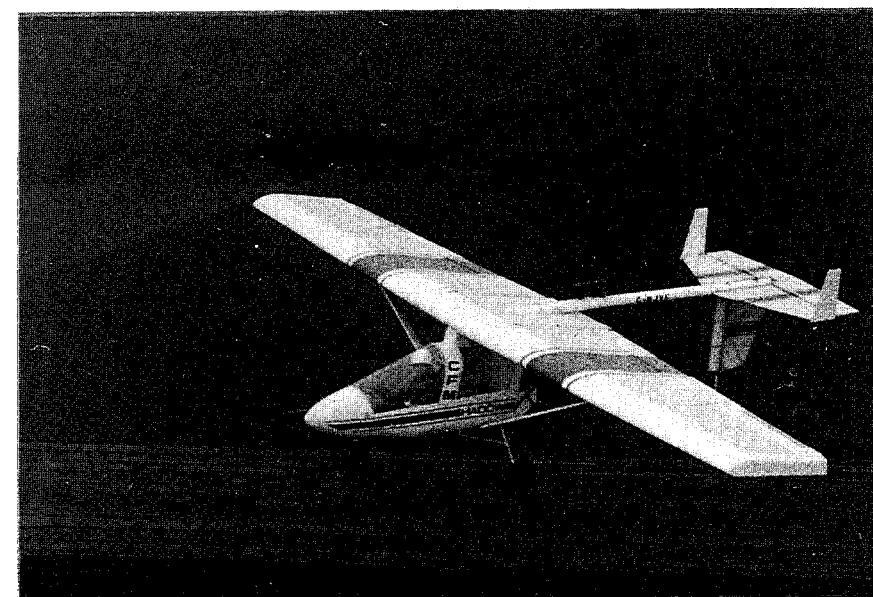


**WORLD AIRSPEED
RECORD HOLDER
CLASS: C-1-a/o**

COOK FLYING MACHINES

Metal-Fax Ltd
Unit 2D
Eastlands Industrial Estate
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Tel: 0728 832353





THE SHADOW

INTRODUCTION

THE CONCEPT

The Shadow has been designed and developed over a two year period to provide the owner with a true "state-of-the-art" light aircraft, having an "air-work" capability yet remaining within the microlight category. In order to produce a two seat aircraft which is both highly durable and of exceptionally light weight, hang glider type construction has been rejected in favour of advanced specification bonded structures. By the use of these materials and careful development of an aerodynamically clean profile all parameters of the original Shadow design philosophy have been achieved. The aircraft is now adding an exciting new dimension to the world of light aviation.

THE DESIGNER

Unlike several designers who have endeavoured to produce commercially viable microlight aircraft over the past few years, David Cook is no newcomer to ultralight aviation. Apart from several years flying in the RAF, David has been associated with light aircraft since the age of 15 and is recognised as one of the pioneers of hang gliding and microlight aviation in Britain. In the early days of hang gliding when most enthusiasts were flying Rogallo-derived flex wings, David instead chose to pursue rigid wing designs and developed a close association with American pioneer Volmer Jensen, whose aircraft he built and flew in this country. It was on one of these, a VJ23, that David became the first powered hang glider pilot to cross the English channel, this being achieved with a 9 h.p. motor and a height gain of only 300 ft over the entire distance! For this success David was awarded the Bronze Medal of Achievement by the Royal Aero Club. It was only when several countries published provisional airworthiness requirements and the future direction of microlight aviation became more clearly defined that David decided to commit himself full time to the development of an advanced and highly sophisticated design. The Shadow therefore is the culmination of years of experience in designing and flying ultralight aircraft and already it has won a major "Best Microlight" award and has established a world airspeed record in its class (79 mph/126.36 kph over a 3 kms course) - truly adequate confirmation of David Cook's design skills.

THE STRUCTURE

In order to achieve the high strength requirements at low weight demanded by microlight airworthiness regulations a variety of materials is used in the Shadow structure. Each component has been tested in compliance with British Airworthiness Requirements and shown to meet fully the criteria set. Although apparently having a strutted wing it is in fact a Cantilever design, the strut having been added principally for "psychological security" and to reduce wing root stress in ground handling. The wing spar employs a unique "I" - beam structure, with a plywood shear web and

preformed alloy capping pieces. Foam/fibreglass ribs are attached to the mainspar, the D-tube being of plywood and the rear wing covering being polyester fabric suitably doped. Inboard three position flaps are operated by Teleflex cable and ailerons by push-pull tubes achieving immediate and low friction response. The body is built from Fibrelam board to produce a robust component of exceptional strength, rigidity and light weight. The main suspension is a steel tube and fibreglass rods to which hydraulic differential brakes have been added. Exhaustive inflight and static testing has shown all components to be entirely practical and suitable for their application.

FLYING THE SHADOW

Whilst some microlights can take as long as 40 minutes to assemble, the Shadow can be transported on an open or closed trailer, and can be rigged ready for flight in under 10 minutes. The Rotax motor can be started by a recoil pull cord from the pilot's seat; an alternative electric start system may be available soon.

Since the canopy is hinged along one edge, entry to the pilot's seat is open and unobstructed. Once installed there is an immediate impression of security and of a compact well conceived pilot's aircraft. Due principally to the fuselage D-tube sides and shaped central bulkhead the pilot's seat feels unusually safe and secure for a microlight aircraft. All controls fall readily to hand (or foot) and are light and responsive. A full array of instruments can be accommodated in the front bulkhead and there is even room for a 720 channel VHF radio and other electronic equipment. The field of vision is exceptional and thanks to the "pusher configuration" is similar to that found on a sailplane rather than a light aircraft.

Entry to the rear compartment is somewhat more restricted and demands a feet-first approach. Once installed, however, it is possible to sit quite comfortably with knees half bent. Just how long one could travel in the rear seat is a matter for individual assessment but the rear compartment is by no means uncomfortable! For in-flight training a control stick can be fitted which is adequate for this purpose since the Shadow is distinctly "stick-dominant". Once again visibility is surprisingly good from side to side. Although the forward view is restricted by the pilot's head and part of the main bulkhead, vision of the horizon is only partially impaired. Ideally the Shadow should not be considered specifically as a training aircraft, rather it is a 1 + 1 with a second seat flight familiarisation capability. A 16 gallon fuel tank can also be installed in the rear compartment and since this is directly on the centre of gravity of the aircraft no trim changes are required when flown laden or unladen.

The aircraft is fitted with hydraulic differential brakes and a castoring nosewheel, therefore a little practice is required to acquaint oneself with the ground control techniques. Turning on the ground is further aided by the fact that the tail-fin is located below the main boom and directly in the propeller blast. Take-off is perfectly straightforward with an application of full throttle and on tarmac the aircraft becomes airborne in 7-8 seconds after a positive rearwards application of stick. Immediately on flying, the control stick is repositioned to climb-out at 60 mph and

depending on the type of propeller fitted and load carried, climb rate is usually between 800 and 1,100 fpm. Once height is achieved, on levelling out, the throttle is reduced to just over 50% and the cruise held at 60-70 mph.

The Shadow has been designed and developed for ease of flying; being quick and responsive to control inputs. The roll rate is 250 per second and in the turn the aircraft "grooves" nicely without any need for corrective yaw input. When needed yaw response is sharp and reassuring and overall only small control movements are necessary to correct attitude changes caused by turbulence. On approach the usual disciplines applicable to aircraft with flap are to be observed, with a progressive reduction in speed and height accompanying an increase in flap deployment. On touch-down the nose-wheel can be held off at speeds as low as 20 mph.

There is little doubt that experienced pilots, particularly those who have flown the faster Service aircraft, will delight in the handling response and performance of the Shadow. Those of limited experience will find the aircraft more "sporty and responsive" than any conventional light aircraft which they have flown, but the handling characteristics are entirely predictable and vice free and pilots quickly adapt to the aircraft with ever increasing confidence.

For the final phase of the test programme an independent test pilot was engaged to analyse the Shadow's flight characteristics and fly the aircraft through radical manoeuvres and "absurd attitudes". This included standing the aircraft on its tail on full power, cutting the throttle in this attitude, repeated attempts to spin from fully vertical power on and off, and loops and past vertical wing overs cutting the power at the critical moment. As a result of these tests the aircraft was shown to have virtually no stall at any power setting or attitude and could not be forced to spin. In addition it could fly exceptionally slowly retaining full aileron control, with two up and engine off, a glide ratio of 13:1 was achieved. In other words, for every 1000' of height one can glide approximately two and a half miles! Some of this flying is contained in the demonstration video (see leaflet enclosed).

COMMENTS BY SHADOW PILOTS

JOHN HUTCHINSON - British Airways CONCORDE pilot, having flown SHADOW Serial No. 010 - G-MNES:

'I really was most impressed by the docile handling qualities and lively performance of your little aircraft; she is great fun to fly and I felt entirely safe and 'at home' in her.'

DON ROBERTS - ex RAF JAVELIN pilot who owns SHADOW Serial No. 008 - G-MNER.

'I made my first flight (plus several more) in the SHADOW today - I found it really enjoyable. It's a delight to handle and quite a step from the MX. I've thoroughly enjoyed myself and look forward to some x-county flying in the near future'.

ERIK STROM PEDERSEN and OYSTEIN GEITZ of NORLIGHT a/s - who own SHADOW 003 - exported to NORWAY.

'Both Erik and I are pilots - the SHADOW is very simple and a wonderful machine to fly'.

Erik Strom Pedersen is also an Aeronautical Engineer.

TIM HARDWICK-SMITH (BE Mech. NZ) - temporarily attached to CFM Metal-Fax who has flown SHADOWs Serial Nos. 002, 006, 008, 009, 010.

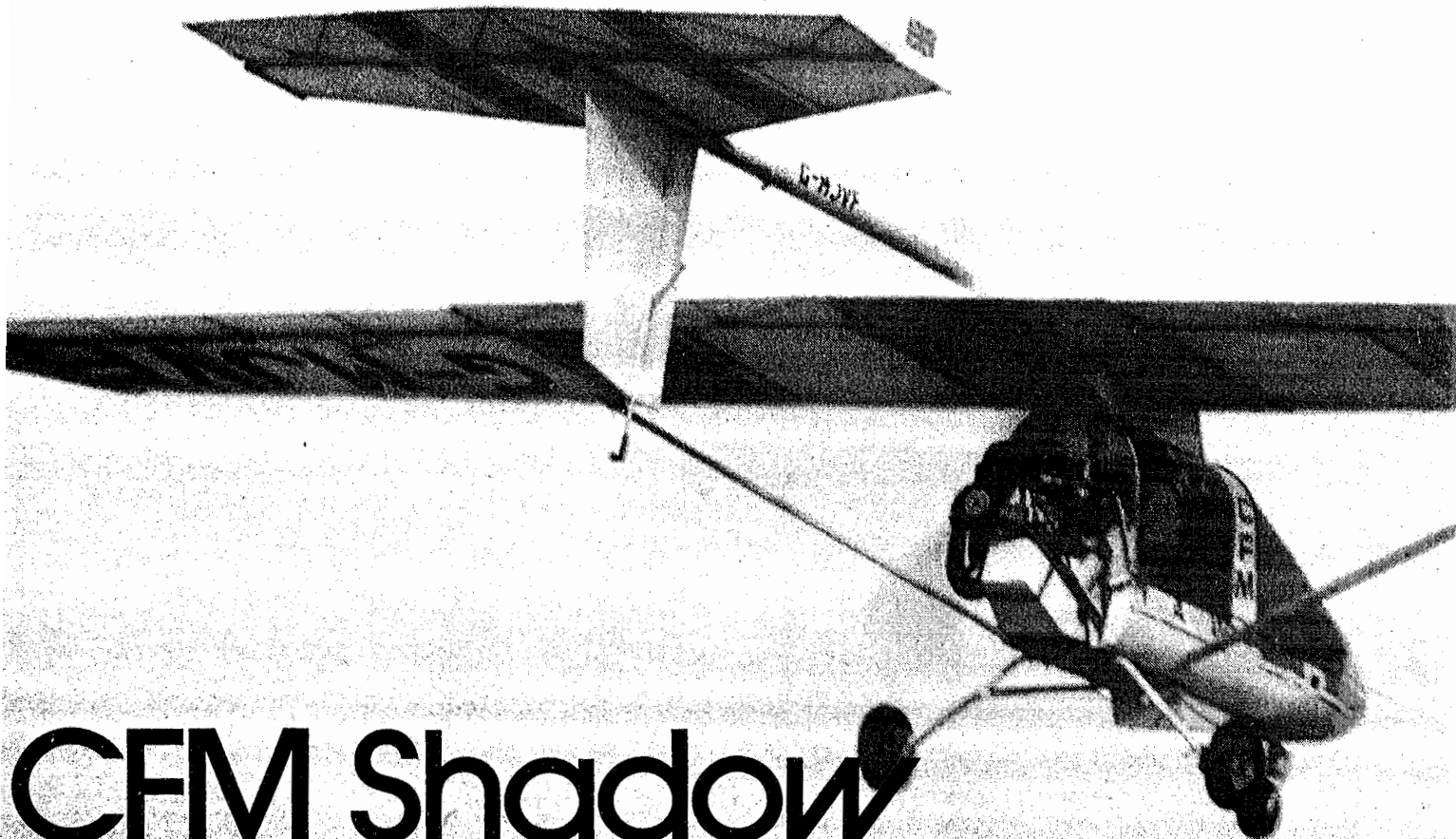
'This aircraft is exceptional in it's light weight and strength. With the combination of low wing loading, high power to weight ratio and an efficient wing that is uniquely anti-stall and unspinnable, makes for a safe and useful aeroplane - and a joy to fly!'

DEREK PIGGOTT - Chief Flying Instructor - LASHAM GLIDING CENTRE

'Best of all, it is real fun to fly. All aircraft bite fools, but this one is safer from the risks of stalling and spinning than any other light aircraft I have known - just what the doctor ordered to revive the light aviation movement!'

SQN. LDR (Ret'd) JOHN PEMBERTON - DFC, CMM and bar

'Those organisations who need a versatile flying machine should look seriously to the SHADOW because I can see it's future as the perfect answer to safe and low cost aviation.'



CFM Shadow

Nothing makes a new type of aircraft quite so much fun to fly as a really snappy take-off and climb. Sitting in the Shadow and giving it full throttle reminded me of my first jet ride: the acceleration is exhilarating, with the aircraft up to 50 mph within seconds and ready to leap off into a climb that makes most light aircraft feel underpowered.

The Shadow works is CAA-approved and is an airy modern building with jigs and machining facilities which enable them to produce almost every part without outside contracting. At present they are producing and selling one machine and two kits per month. The Shadow has full CAA type certification.

Customers have the choice of buying the kit in stages, so spreading the cost over a period, or of buying the aircraft, test flown and complete with a full Permit to Fly. Already there have been sales of eight kits and seven complete aircraft, and a number of these have gone abroad to Australia, Norway, France, Yemen and Portugal. No real effort has yet been made to sell the machine, which has allowed time and experience to be accumulated to ensure that any possible snags both in the aircraft and the kit have been ironed out over the past three years.

The Shadow is a very light pusher aircraft with a high boom and tricycle landing gear. All the controls are quite conventional. The control stick is mounted on the right side of the cockpit with the throttle and choke on the left-hand side: these fall easily to hand. The rudder pedals have heel-operated levers linked to the mainwheel independent braking system. The nose-wheel is fully castoring to facilitate steering on the ground.

With the last machine off the production line delivered just before my visit, there was only the prototype left for me to fly. This had been used for all the certification tests and development

flying and had made over six hundred flights totalling 300 hours. Production machines have a slightly enlarged cockpit to cater for almost any size of pilot, though I found the prototype cockpit very comfortable and at least as roomy as that of many gliders I have flown. Four-point harnesses are standard on the production machines. The canopy is two-dimensionally bent plastic made of polycarbonate and guaranteed unbreakable by the plastics experts; it opens sideways to allow easy access for the pilot.

The rear cockpit is entered by lifting either side panel. Provision is made for full dual controls by the fitting of a stick, throttle and flap lever with rudder pedals mounted in a small bulge in the fuselage floor: this gives more room for the passenger or instructor. The view from the front seat is very similar to that in a modern glider: totally unobscured round to the wing.

The engine controls consist of a very sturdy throttle lever that would do justice to an F-15, a choke control for very cold weather starting, and the magneto switch. The starting is by the usual mowing-machine type of recoil starter, pulling the rope just above the pilot's head. I was told that it is possible to restart in flight. Normally starting is done from outside the cockpit, standing by the nose where the throttle and switches are within easy reach and where the aircraft cannot move forward without first knocking down the pilot or person starting it. A hand primer is fitted in the fuel line, but neither this nor the choke seemed necessary. In spite of the wintery weather it started hot or cold on all four occasions with a single pull of the toggle — an impressive performance for any engine.

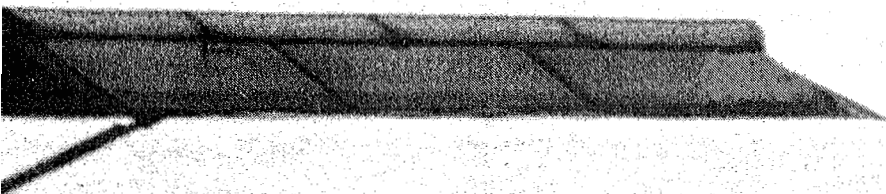
The engine is a Rotax 447 two-cylinder two-stroke producing about 40 hp at 7,000 rpm. The propeller is driven through a 2.58:1 gearing so that it turns over at less than 2,000 rpm in normal flight. An elaborate-looking silencer is standard,

and makes the aircraft far quieter than the average light aircraft in flight. Perhaps because of the gearing the engine seems to run more smoothly than most little two-strokes, and it does not seem to worry whether it is running at any speed or idling for fairly long periods. Of course some kind of ear-defenders or radio headset are essential, as the weight limitations do not allow much sound insulation for the cockpits. I wore a normal agricultural pair of ear-muffs, and found the noise level in flight quite acceptable.

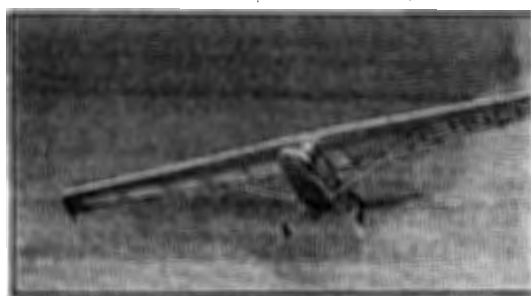
The instrument panel has room for more than the essential instruments, and besides the usual ASI, altimeter and vertical speed indicator has a rev counter and a combined cylinder-head temperature and exhaust-gas temperature gauge.

The side stick was a new item for me, but is only of concern for the take-off and the first few seconds of the flight. The only extra problem is in telling when the ailerons are central; this could be made easier with some kind of indent in the middle position when the stick is held right back at the start of the take-off run. Since that position is never used in flight it would be no embarrassment. The rudder is absolutely conventional, although a little lighter than on most aircraft. Taxying in the strong crosswind I had to use wheel brake to stop the weathercocking, which probably would not have been necessary on grass when more power would have been required to keep moving. The aircraft sits firmly on its wheels, and even a rapid swing failed to make it lean even slightly sideways.

I found the wheelbrakes easy to use for taxiing, but not so easy after landing in the crosswind, when I anticipated the swing into wind and then suddenly needed the other brake to prevent running off the other way. Flying a new type I normally take extra time to get thoroughly used to the wheelbrakes and steering before trying to fly, as my experience has been that far more



The most impressive thing about this microlight is its speed range: it is happy cruising at 70 mph, has a max speed of 95 mph, and a minimum (with no defined stall) of 38. It is positively stable and handles like any other light aircraft. The view ahead is up to glider standards. Best of all, the Shadow is real fun to fly. Flight test by Derek Piggott.

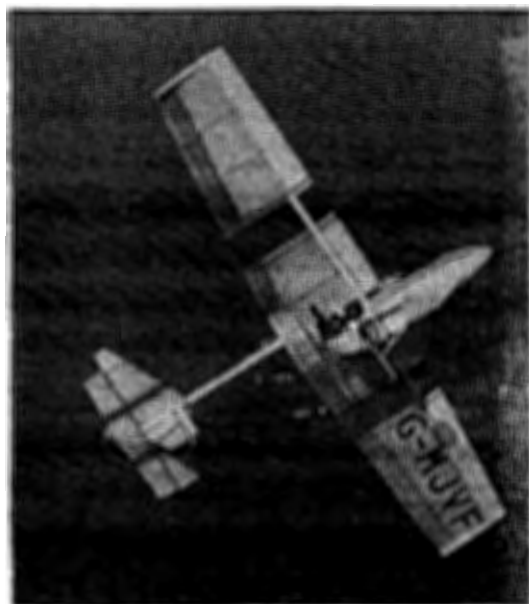


The Shadow is a very light pod-and-boom pusher, with full CAA certification — and conventional three-axis controls via a sidestick controller and rudder petals. It is offered complete, or in kit form. Three a month are being turned out.

machines get damaged by ground-loops and swings on the ground than by bad landings. However with a nose-wheel ground-loops are out of the question.

Worrying somewhat about the rather nasty crosswind (at the time 10 knots or so at right-angles) I did not make a very good job of the first take-off! In spite of the careful briefing I let the stick forward before the nose-wheel had lifted off the ground, and by the time I had eased back again and glanced at the ASI it was showing over 60 mph. The acceleration is certainly impressive! Remembering my briefing, I made a quick turn into wind at fifty feet for noise abatement, and up she went in an exhilarating climb showing almost 1,000 feet per minute. From that moment I knew I was going to enjoy my flight, and seeing a couple of American A-10s flying nearby I could not help feeling tempted to go chase, for this is the kind of feeling I always get zooming up at a steep angle of climb.

Flying solo and well below the maximum permissible weight, the rate of climb was well above the claimed 700 feet per minute. David Cook mentioned that all the quoted brochure figures



are a little below the actual figures and should be achievable by every machine and not just the prototype. A quite definite backward pressure is needed when climbing; I missed a trim control and the pleasure of having the aircraft in trimmed flight all the time. However with that rate of climb I was soon up at 2,000 feet and high enough to try stalling and attempting to make it spin — which I knew had been found impossible by other pilots.

Because of the very short side-stick and high gearing the aileron control seemed a little heavy for any of handling tests I was doing, but very reasonable for any normal flying and for flying across-country. The rate of roll from 45 degrees to 45 degrees at about 60 mph was under five seconds, using full aileron and a moderate amount of rudder to prevent any adverse yaw. Using a large amount of aileron with the rudder locked centrally the adverse yaw is much like that in many gliders, and more than in most light aircraft. However quite reasonable turns can be made without co-ordinating properly, and the average Cessna driver would not find any difficulty — although to get the best results some rudder is needed for the entries and recoveries from turns.

But perhaps the most impressive thing about this aircraft is the speed range. It was very happy cruising at 70 mph at 5,000 rpm with the propeller turning over at less than 200 rpm. It was just about trimmed-out hands-off at that speed, and positively stable, needing very little attention and handling like any other light aircraft. The maximum level speed is stated as 95 mph; this very aircraft still holds the world speed record in the C-1-a/o class.

At my cockpit weight of 170 pounds there is no defined stall. This does not seem to be because of lack of elevator authority, as there is ample elevator power for fully held-off landings and for tight turns at any speed. Even when raising the nose fairly rapidly there is no buffet, and the most that can be induced is a very slow gradual drop of the nose by a few degrees and a higher rate of descent. Under power the slow-speed characteristics are even more impressive. The nose can be pulled right up to a sixty-degree angle, and with full power all that happens is again a very gradual lowering of the nose until a slow climb-away occurs. With full rudder and any position of the ailerons there was still no tendency to drop a wing, and so no possibility of making it spin, a truly unusual performance with positive aileron and rudder control throughout. Flying in this extreme nose-high attitude facing into the wind brought the ground speed down to only a few miles per hour, and with the superb downward view I couldn't help thinking that for use over the countryside the police might do better to have a dozen of these rather than one Optica. Not only could they do the same job, but they could operate from any reasonably smooth farmer's field and at only a fraction of the cost.

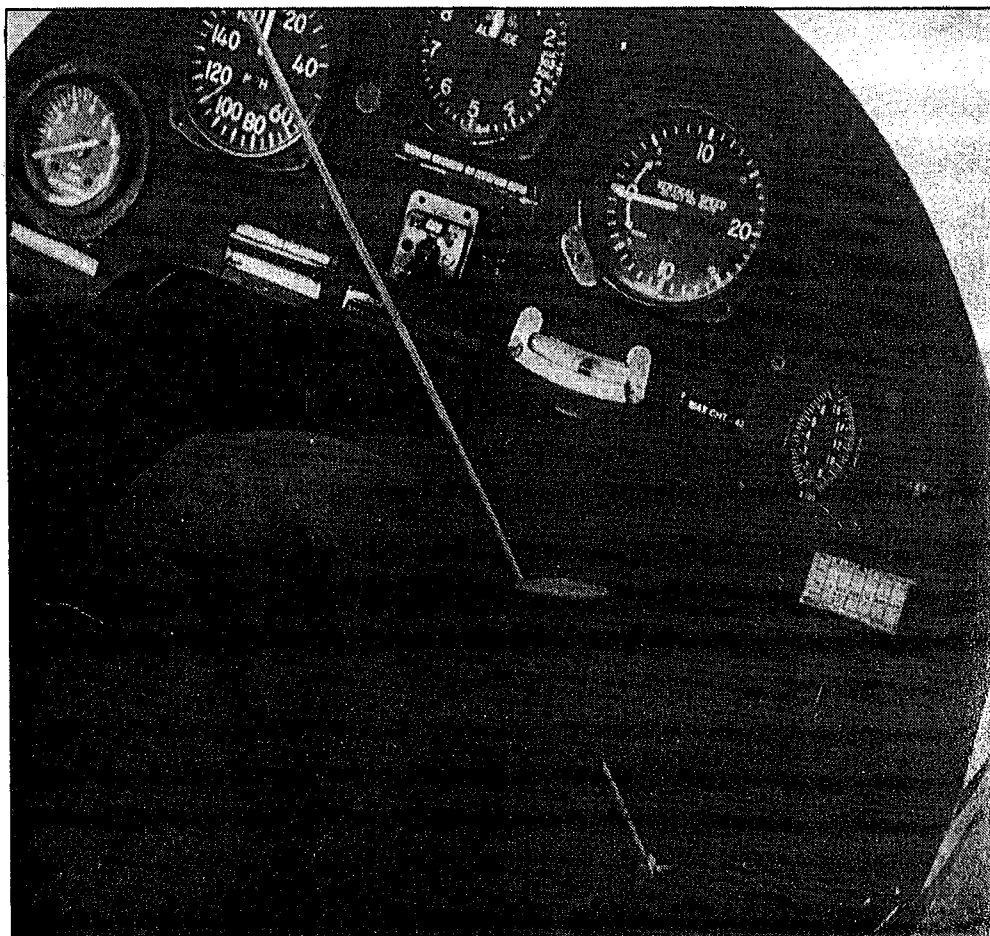
With the flaps lowered the main change is an improvement in the aileron response and a steepening of the approach. I didn't bother with them much on my flight, as there was a stiff crosswind by then and I preferred to limit the drift by having a little higher touchdown speed. The approach seemed typical of any light aircraft but with a far better view ahead. The side-slipping characteristics had been perfectly normal, so I elected to use a winged approach at 60 mph. At this speed it was easy to make a well held-off float and a very light touchdown on the main wheels. Opening the throttle again and to go around the Shadow leapt off again, and within a few seconds I was up high enough for a low circuit and a second try. This was real fun-flying with no worries about those fiends who insist on making

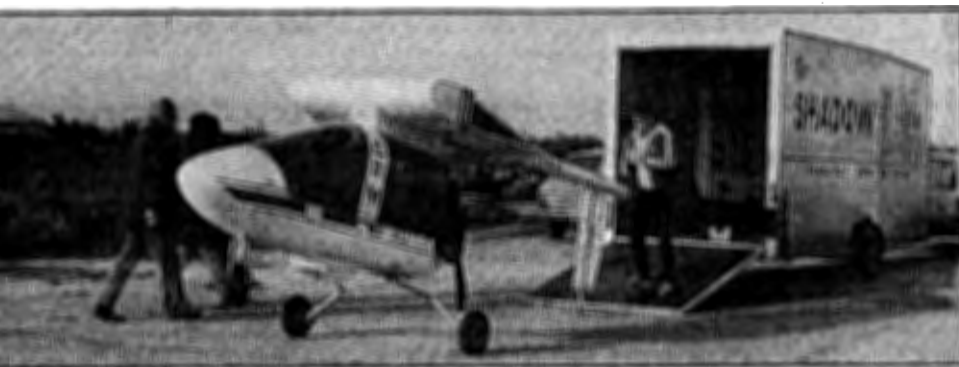
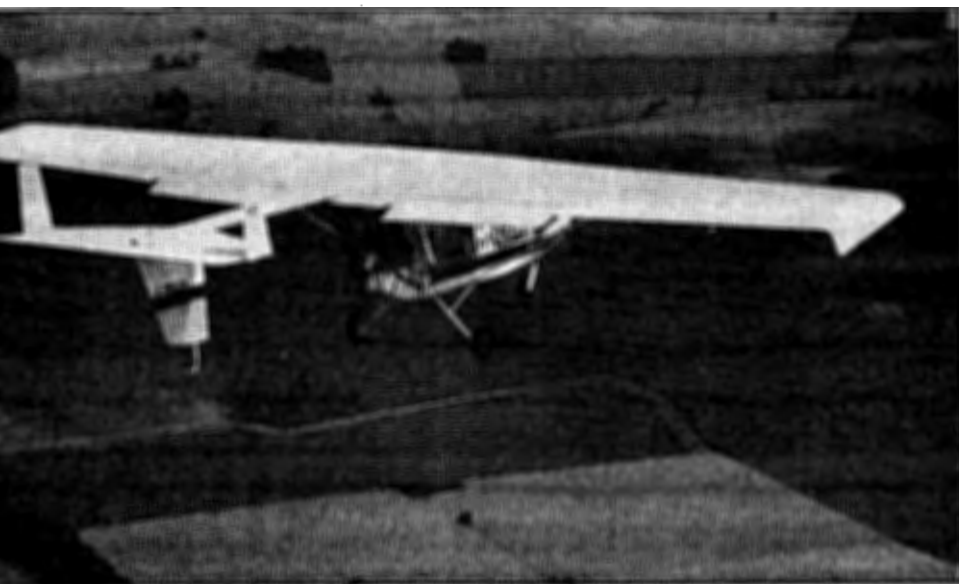
Transport Command circuits, or air traffickers who want radio calls to let them know exactly where you are on the circuit.

One more landing and my treat was over. I taxied in to park near the trailer/hangar and switched off to chat to the designer and originator David Cook.

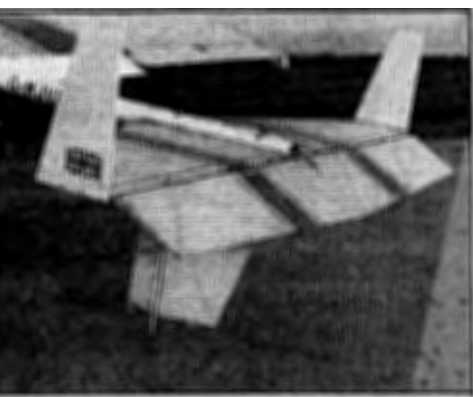
The Shadow owes many of its aerodynamic features — including the wing aerofoil — to the very successful Volmer Jensen VJ-23 Swing-wing rigid-wing hang-glider. It was with one of these machines fitted with a little two-stroke engine that David Cook became the first person to fly a powered hang-glider across the English Channel, for which he was awarded the Royal Aero Club Bronze Medal for Aviation Achievement. He has had many years experience as chief designer of Richard Garrett Engineering Ltd., as well as much experience in instructing and flying many types of microlight aircraft. Since 1980 he has concentrated all his energies to developing and building the Shadow. In its construction he has used what he considered to be the most appropriate material for the part concerned. Extensive use is made in the main fuselage of fibrelam, a glass and honeycomb sandwich board used for floorboards in many airliners. In the kit this comes computer-cut to shape and ready to glue together. The wing spar is an I-beam using preformed alloy spar caps and a ply web. The whole D-box including the finished spar and fittings comes complete ready to attach the foam ribs. The rear fuselage or boom is a standard alloy tube, and is also finished and jig-drilled at the works. Apparently if you order a completed machine they simply take the next kit out of stores and assemble it!

It would take you approximately 300 man hours to complete the kit version; no special tools or experience is required. Detailed con-





Much of the Shadow's aerodynamics derive from Volmer Jensen's VJ-23 Swingwing, with which Shadow designer David Cook became the first man to fly a powered hang-glider across the Channel. The Shadow's structure is a mix of metal and composites; kit assembly time is estimated at 300 hours. Options include floats, and a trailer-hanger — rigging takes two people about ten minutes.



struction manuals are provided with a photo supplement to help the builder.

You may ask why pay all this money for an aircraft when you could buy a second-hand light aircraft for the same amount? Well, there seem to be various advantages. First, you get a new machine and not a clapped-out fatigued one. It can live in its own trailer/hanger ready to drive out to the airfield — or indeed, any farmer's field which is suitable. Any unobstructed area of about 150 metres would be sufficient once you have become really familiar with the machine. So no hangarage fees and possibly no landing fees are payable — apart from the odd bottle of whisky for the farmer. It can be taken out of the trailer and rigged by two people, and it only takes about ten minutes. The fuselage is just rolled out ready to attach the wings and tail. The wings are very lightweight and not unreasonable for the girl-friend to handle. (Anyway she can have a ride for her trouble!) Any servicing can be done by the pilot, who if he has built the machine already knows every nut and bolt. Similarly with minor repairs, so that running costs come out at about £5 to £10 per hour all in!

The engine life is about 400–600 hours before



a complete overhaul, or if preferred a new engine can be bought for about £750.

Looking at the kit of parts one is reminded of a modern model kit. Most of the major parts are semi-finished and there is only glueing, some fibre-glassing and the covering to do.

During the assembly the work has to be inspected and signed off at four stages by either a PFA or BMAA inspector or by the factory. Help is available if there are any troubles, or of course for an extra £3,850 you can have a completed aircraft.

So what did I *not* like about the aircraft? Well, I would certainly want to build my own rather than buy it assembled so that I knew all about the structure and could confidently service it. The ailerons are just a little heavy to my taste, but I expect most other pilots would be very happy with them. I did not like the canopy catches: they are better on production aircraft, and now lock the canopy against any push up from inside. It would be nice to have even a crude form of elevator trim, but otherwise it was fine from the flying point of view.

What can you do with the aircraft? Well, it was fitted with crop-spraying equipment and tested by the ICAP at Cranfield for ULV applications. It is obviously suitable for observation and surveillance purposes, and at least one farmer has bought one for rounding-up cattle on his ranch. It can be fitted with floats, and has a good performance flying from calm water sites such as lakes and other inland waters.

But perhaps best of all, it is real fun to fly. All aircraft bite fools, but this one is safer from the risks of stalling and spinning than any other light aircraft I have known. It is just what the doctor ordered to revive the light aeroplane movement!

It would be perfectly safe to do initial training on such a forgiving machine, but for a pilot who is going to fly other types more experience of stalling and spinning would be essential. I would like to teach in it to see just how quickly a student would master it: my guess is that it would not take long.

By the way, it is categorised as a microlight, a dirty word to many pilots. Better to call it a mini light aircraft, for that is what it really is.

CFM Shadow

Specifications	
Wing span	33 feet
Wing area	162 sq ft
Weight empty	331 lbs
Maximum AuW	767 lbs
cockpit loads:	
front	121 to 198 lbs
rear	0 to 198 lbs
Fuel capacity	5 imp gals
Performance	
Never-exceed speed	108 mph
Max cruise	75 mph
Econcruise	65 mph
Min speed (no defined stall)	38 mph
Rate of climb	700 fpm
Take-off run	295 feet
Range at econ cruise	130 miles
Endurance at econ cruise	2 hrs
Engine: 40hp Rotax 447 two-cylinder two-stroke.	
Price: kit (in four stages) £6,900 plus VAT. Dual control version is £7,300 in kit form, or £11,275 complete. Information pack: £2. Video: £10.	
Ready to fly: £10,750 plus VAT.	
Extras: custom-built hangar/trailer, long-range tank, floats, crop-spray system, airframe recovery parachute system.	
Manufacturer: CFM Metal-Fax Ltd., Unit 2D, Eastlands Industrial Estate, Leiston, Suffolk, IP16 4LL. Tel: (0728) 832353.	

UTILISATION

PRACTICAL APPLICATIONS

In view of its superior performance the Shadow is quite capable of handling various work loads and it is in this area that the aircraft becomes highly cost effective. When flown solo with the additional fuel tank the aircraft can cruise for 400 miles without refuelling, thus offering incredible cross-country potential. In addition, being a high wing machine, the pilot has an almost uninterrupted 360° arc of vision. The aircraft can fly slowly (40 mph), is extremely manoeuvrable, yet provides a stable platform for ancillary equipment. Its short take off and landing ability and ease of transportation (in a custom-built trailer which doubles as a hangar) makes it versatile and flexible to operational requirements. Two people can assemble the aircraft in 10-15 minutes.

AERIAL SURVEILLANCE

The aircraft with single pilot operation is ideal for prolonged observation. Search operations, traffic control and reporting, forestry fire watch, pipe-line/power cable monitoring, land and livestock management, fence and border patrols are some of the more obvious applications. It is possible to install a TV and video camera with a microwave transmitter to a ground command station/vehicle.

FLOAT FLYING

The Shadow can be fitted with floats and is capable of calm water operation from sheltered sites. There is excellent rudder response on the water and there is no difference to in-flight handling characteristics at normal speeds (up to 80 mph). Take off distances are in the region of 600 ft. The changeover from floats to wheels is both simple and quick.

CROP SPRAYING

Trials have proved that the spray equipment fitted to the Shadow has considerable potential - especially abroad for crop improvement, defoliation and pest control. An 'in-cockpit' monitoring device enables the pilot to deliver the correct flow rate relative to his airspeed. It is also adjustable for various droplet sizes demanded for differing applications. The system is most effective and comparatively very cheap.

LEISURE/PLEASURE

For the equivalent cost of a high performance car the Shadow provides fun and sport flying at a cost of under £5 per hour. It is exhilarating to fly and can be likened to a "Formula-Car" in the sky!

SPECIFICATION

ENGINE

The following power plant is fitted as standard to production aircraft. It has an integral reduction drive (2.58:1) to a two blade wooden pusher propeller.

BOMBARDIER ROTAX 447 - two cylinder - two stroke - 436 cc
approximately 40 BHP

FUEL CAPACITY - ENDURANCE

With standard tank - 5 Imp Galls (22.7 litres) - 1 $\frac{3}{4}$ hrs with small reserve

With additional tank - 16 Imp Galls (72.6 litres) - 8 hrs with small reserve

(N.B. These figures based on the maximum cruising speed of 75 mph/
65 knots at AUW).

DIMENSIONS

At a 'Loiter' speed of 75 mph/65 knots with Pilot only (73 kgs/
161 lbs) a fuel consumption of only 2 galls (9.08 litres) per hour
can be expected.

Wing Span	10.03m ₂	(32ft 11in)
Wing area, gross	15.00m ²	(162sq ft)
Wing aspect ratio	6.58	
Length overall	6.40m	(21ft 0in)
Height overall	1.73m	(5ft 8in)
Propeller diameter	1.30m	(4ft 3in)

WEIGHT AND LOADINGS

Aircraft Empty Weight	150 kgs	(331 lbs)
Maximum Take-off weight -AUW	348 kgs	(767 lbs)
G rating (Ultimate)	+6.0/-3.0	

FRONT COCKPIT LIMITS

Pilot - Weight range: MIN: 54.5 kgs (121 lbs) MAX: 90 Kgs (198 lbs)

REAR COCKPIT LIMITS

Passenger/Freight - Weight range:

MIN: 0 kgs (0 lbs) MAX: 90 kgs (198 lbs)

PERFORMANCE

AT MAX AUW

Never exceed speed	94 knots (173 kph : 108 mph)
Max. level speed	83 knots (152 kph : 95 mph)
Max. cruising speed	65 knots (121 kph : 75 mph)
Econ. cruising speed	57 knots (105 kph : 65 mph)
Min. Flying speed (no defined stall)	33 knots (62 kph : 38 mph)
Max. rate of climb (S/L)	3,6 m/s (700 fpm)
* T-O run from metalled surface	90 m (295 ft)
* T-O run from prepared grass surface	100 m (328 ft)
* Landing run (with some use of brakes)	75 m (246 ft)
Ceiling	3048 m (10,000 ft - without oxygen)

* No wind

WITH PILOT ONLY - AVERAGE WEIGHT (73 kgs/161 lbs)

Max. rate of climb (S/L)	4,5 m/s (900 fpm)
* T-O run from metalled surface	35 m (115 ft)
* T-O run from prepared grass surface	40 m (131 ft)
* Landing run (with some use of brakes)	45 m (148 ft)

* No wind

RANGE - (assuming max. cruising speed 65 knots/75 mph - allowing small reserve)

With standard Fuel Tank	approximately 208 kms/130 miles
With additional Fuel Tank	approximately 960 kms/600 miles

GOSPRAY SYSTEMS

'The SHADOW has demonstrated that it
could become an effective tool in agriculture'

We have produced a lightweight and efficient aerial crop spraying unit to complement the full Type Certification of the SHADOW by the UK Civil Aviation Authority. Considerable research and development has gone into this system to provide the optimum Ultra Low Volume capability. The concept incorporates the latest technology with a modular design for quick and easy service, assembly and removal.

Preliminary ULV/LV trials using water sensitive paper were most encouraging. The SHADOW aircraft proved that it was more than capable of meeting the required demands in respect of take off, landing, payload and most importantly the in flight handling. Consequently, it was arranged that the whole 'package' should be evaluated by the International Centre for the Application of Pesticides (ICAP) at the Cranfield Institute of Technology. The aim of this exercise was to obtain an objective assessment with detailed results from the most experienced and independent authority available.

The SHADOW is a high wing monoplane, with a strutted cantilever wing and conventional 3 axis control. For transportation the wings and tailplane are easy to dismantle and assemble (within 10 minutes). In addition to the pilot a 90 litre/16 gallon 'hopper' with a 'dump' facility can be carried in the rear seat compartment.

The aircraft is simple to fly, very stable and has exceptional anti-stall and spin characteristics. Combined with an excellent speed range of 25 - 95 mph and ease of ground handling, the SHADOW with its associated GOSPRAY system has 'a natural role in agriculture'.

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VIDEO ORDER FORM

TO: COOK FLYING MACHINES (METAL-FAX LTD) UNIT 2D EASTLANDS INDUSTRIAL ESTATE LEISTON SUFFOLK IP164LL TEL: LEISTON (0728) 832353	FROM: _____ _____ _____ _____ _____ TEL : _____
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TICK

☐

Please forward Video Tape (£10.00 enclosed) - I understand this remains my property. Please make your cheque payable to CFM Metal-Fax Ltd.

☐

I am interested in purchasing a Shadow, please forward official order form.

☐

I am interested in The Shadow in easy-build kit form.

COMMENTS

THE SHADOW - MK I

SERIES B

PRICE LIST

SHADOW aircraft Factory completed and supplied with the following instruments:

Air Speed Indicator, Altimeter, Fuel Gauge,
Tachometer and EGT

* Single Controls	£10,870
Dual Controls	£11,750
* A 'Footwell' can be fitted to the rear cockpit - extra	£ 195

OVERSEAS OPTIONS

BRS - Airframe Recovery Parachute System (includes fitting)	£ 995
Floats with fittings	£ 1,150
Long Range Additional Fuel Tank	£ 225
Trailer/Hangar - all aluminium, custom built, double skinned	c £ 3,300

DOCUMENTATION

Factory completed aircraft will be delivered with CERTIFICATE OF REGISTRATION (with letters affixed)	£ 35
PERMIT TO FLY	£ 150

KIT

* Single Control	£ 7,020
Dual Controls	£ 7,500
* A 'footwell' can be fitted to the rear cockpit - extra	£ 150

EXTRAS - can be purchased individually

Pilot's Notes	£ 5
Service Manual	£ 15
Video - VHS or BETAMAX - (PAL system only)	£ 10

NOTES

1. All prices are EXCLUSIVE OF VAT at 15%,
packaging, freight and insurance.
2. A 20% Deposit is required with your order.
3. Cheques to be made payable to CFM METAL-FAX LTD.

JUNE, 1986

New rôle for Shadow

BIGGIN HILL & LEISTON

An attempt to fly from England to Australia in a tiny Shadow light aircraft got off the ground last week as 28-year-old Eve Jackson took off from Biggin Hill on the first leg of her 12,500-mile journey.

But though the small aircraft, officially classed as a microlight, finds a home with private pilots, the Shadow has other uses, too. One is to photograph Indian cities as part of a survey sponsored by the Dutch International Institute for Aerospace and Earth Sciences. A Shadow, which weighs 331lb empty, is being air-freighted to Hyderabad from Suffolk-based manufacturer CFM Metal-Fax to begin its mission. Some 17 have been built and 34 are on order, writes J. M. Ramsden.

Costing less than £11,000 (plus trailer-box), the two-seat 40 h.p. Shadow has a speed range of 38-95 m.p.h., endurance (with an extra tank) of nearly 8hr, and a claimed inability to stall or spin. Aerial photography with the Shadow costs just 5 per cent of that carried out with a

Piper Navajo, says CFM.

Co-directors David Cook and Mike Plewman foresee an aerial-work market for up to 50 Shadows a year. The aircraft can be delivered as a kit (at £6,900), or completed with a CAA permit to fly in the microlight category. CFM prefers to describe the Shadow as a "mini aircraft" with the certification advantages of microlight. Fuel consumption is given as 2½gal/hr, and take-off and landing distances are described as "playing-field". The structure is tested to +6g and -3g. Controls are normal three-axes stick and rudder, throttle, two-position flaps, and differential wheelbrakes. Structural materials are aluminium, wood, and Ciba-Geigy Fibrelam.

The Chinese Government is said to be showing an interest in the Shadow for aerial mapping, a major avionics company has been testing a surveillance pod on the aircraft, a crop-spraying version using the electrodyne technique to reduce fluid weight and volume is to be tested, and a float plane version has been flown.

Complete aircraft can be delivered in August or mid-September. Details from CFM (Eastlands Industrial Estate, Leiston, Suffolk IP16 4LL, England; tel 0728 832353).

Eve Jackson prepares to leave Biggin Hill for Australia in a Shadow. An auxiliary tank gives a 500-mile range

