OPTICA SCOUT

THE BIG PICTURE

Now we've seen everything.

BY MARK R. TWOMBLY

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function. Its task is to observe, and it does it well. The view from inside the cockpit sweeps through 270 degrees vertical and 340 degrees horizontal. If seeing is believing, the Optica is an airplane you can believe in.

An estimated 8,000 helicopters are in use worldwide for observation. Helicopters are favored as observation platforms in part because of their hovering and maneuvering capability and also the visibility from inside the bubble. The Optica provides that visibility, but with the simplicity, ruggedness, and operating economy of a piston-powered single-engine airplane. It can loiter for up to eight hours without refueling, and the cockpit is remarkably free of vibration, an important consideration for observation work involving cockpit-mounted cameras. The concept seems simple enough, yet it has been a long and difficult journey from idea to execution.

The Optica was designed by John K. Edgley, a British civil engineer who reportedly conceived of it while conducting aerial damage surveys in the aftermath of an Australian hurricane. Edgley earned an aeronautical engineering degree enroute to designing the Optica, which he envisioned as neither a helicopter nor an airplane, but a hybrid that combined the best features of each.

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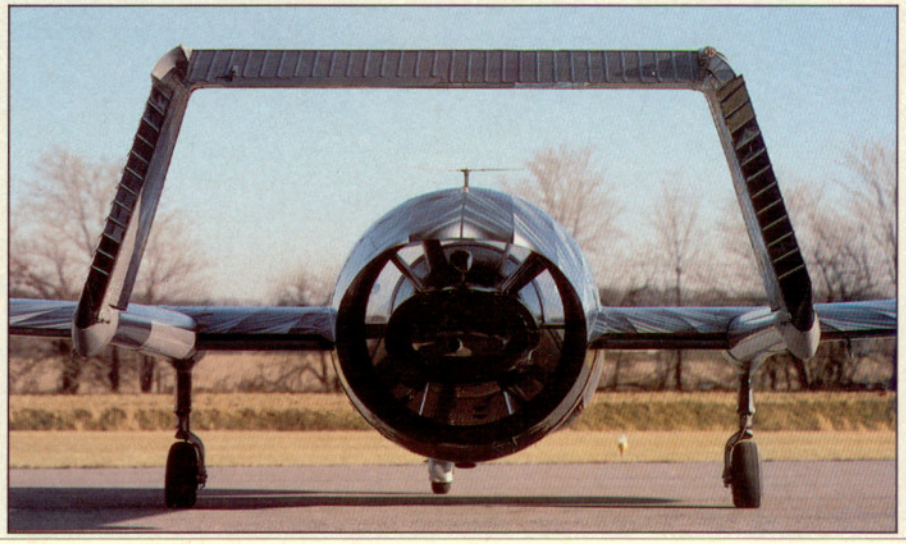
The Edgley Optica debuted at the 1979 Paris Air Show. Its unorthodox shape attracted immediate attention, but it would be six years before the Optica received British certification. The first customer was the Hampshire County police force in southern England. Edgley's long-awaited triumph quickly turned to disaster when Hampshire's Optica crashed in May 1985 on its first operational patrol. The airplane was re-



ported to have descended to about 150 feet agl, apparently under control, then entered a steep roll. It crashed into trees, killing the pilot and observer. British aviation authorities were unable to determine the cause of the crash, but there was speculation the passenger, an inexperienced observer, may have become frightened and interfered with the controls.

The accident halted sales of the Optica, plunging Edgley into bankruptcy. Early in 1986 Brooklands Aerospace Group, which builds major aircraft sub-assemblies for British Aerospace, consults on aircraft design, and performs aircraft ground handling and maintenance, bought the assets of Edgley Aircraft, Limited. Included was the Optica manufacturing facility at Old Sarum Airfield in Salisbury, Wiltshire. Like Edgley, Brooklands perceived a significant market for an airplane built expressly for observation.

Brooklands recertified the Optica in 1986 after making some 46 changes, including an increase in payload to 510 pounds and enhanced lateral and longitudinal stability achieved by adding wing tips with upturned trailing edges and extending the exhaust end of the ducted fan housing. Prop wash from the fan had been disrupting airflow over the horizontal stabilizer. A downturned lip was added to direct turbulent prop wash away from the tail.

Brooklands' fledgling Optica program suffered an early setback when, in January 1987, hangars at Old Sarum housing eight Opticas burned. The company pressed on, however, and the first Brooklands-built Optica has been sold and is in service—with the Hampshire police. Brooklands has formed a joint venture with an Australian aerospace company to market an electronic surveillance version of the Optica. Egypt is evaluating an Optica for use in patrolling its desert borders, and the Kingdom of Jordan's public security department has ordered one.

The Optica is not yet certified in the United States, although Brooklands has applied for it and is attempting to set up a distributor network here. In the meantime, Brooklands is being represented in the U.S. by International Planning and Analysis Center, Incorporated (IPAC; 450 Fifth Street, N.W., Washington, D.C. 20001; telephone 202/626-1300).

G-TRAK, a British-registered demonstrator, has been in this country since last fall. The unusual paint scheme is a

consequence of its starring role in *Slipstream*, a soon-to-be-released movie filmed in England and Turkey.

The federal Bureau of Land Management leased G-TRAK for about six weeks and, with other federal agencies, used it to survey marijuana fields, count wild horses, and as an airborne command and control center for fighting forest fires. It has been shown to private pipeline patrol operators, law enforcement agencies, utilities, the Federal Bureau of Investigation, Civil Air Patrol, and traffic reporters for commercial radio broadcast stations.

IPAC reports positive reception of the Optica but, as yet, no contracts. The chief impediment to sales is the unfavorable value of the dollar in comparison to the British pound. Although a final U.S.

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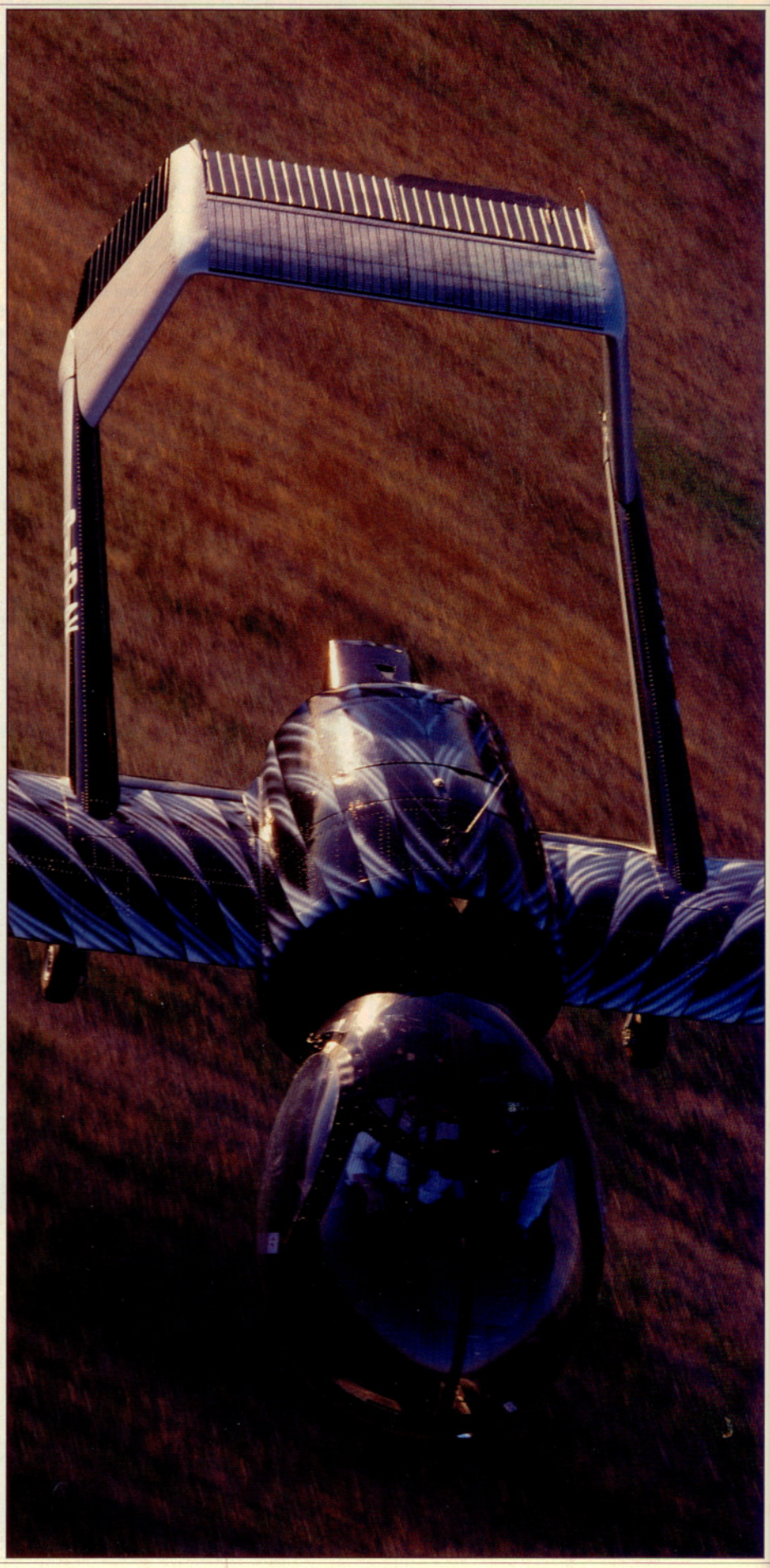
price has not been determined, it will be in the neighborhood of $200,000, according to Granville Hodge, managing director of Brooklands. That is less than half the cost of a new turbine-powered single-engine helicopter, which is what Hodge considers to be the competition.

Duane H. Erikson, a retired Air Force brigadier general and transport pilot and now a senior associate at IPAC, checked us out in G-TRAK. One learns quickly that, in the Optica, gawking is a two-way street. While we were enjoying the Optica's powers of observation, others were observing us. The Optica's curious configuration attracts crowds like bees to honey. Tower controllers quizzed us, strangers stopped their cars, and pilots approached for a closer inspection. Most people liken it to a giant insect, which is not far from the truth. The story goes that Edgley's wife pointed out to her husband that an insect's eye is the optimum shape for wide-angle viewing. Hence the Optica's bugeye bubble.

The bubble rests on a curved, spoon-shaped metal pan. Thick support beams bisect the cockpit but hardly impair the view. Three individual seats are situated



abreast, with space behind for 66 pounds of equipment. The airplane can be flown from either the middle or left seat, each of which is equipped with a control stick and rudder pedals. Flight and engine instruments are contained in a helicopter-like pedestal. Throttle, hand-brake lever, trim wheel, and electric flap switch and indicator are located in a console between the two pilot seats.

The observer sits on the far right. The virtually unobstructed view, which is enhanced by convex-shaped doors that enable one to look down as well as out, can be unnerving, especially in turns to the right. A caution in the flight manual inserted as a result of the Hampshire crash warns of the potential for a passenger to grab the control stick ahead of the middle seat and use it as a handhold. The manual recommends that the middle set of controls be installed only when the airplane is flown on pilot training missions.

Cockpit bubble, wings, and engine converge in the Optica's thorax. Metal stators secure the cockpit structure to the shroud. The slipstream flows around the bubble and into the shroud, which encloses the 260-horsepower Lycoming IO-540 engine and wooden five-blade fixed-pitch propeller. The forward-facing engine is mounted in a removable pod for accessibility. A scant 0.06 inches separates propeller tips from the shroud. The minimal clearance helps reduce propeller noise, while flexible rubber mounts between engine and pod, and hard rubber mounts between pod and shroud, isolate vibration.

One mandatory preflight drill is computing the weight of pilot, passengers, and equipment or baggage, if any. If the total is more than 364 pounds (165 kilograms), ballast must be shifted to the tail to maintain an acceptable center of gravity. The ballast, a pair of 16.5-pound (7.5-kilogram) bar weights, is secured to the cockpit structure ahead of the pedestal. Each weight can be removed and stowed in a small compartment in each of the two vertical stabilizers. Ballast must be carried in either the nose or tail; weights cannot be split between the two locations or left behind. Red lights in an overhead annunciator panel show where each weight is stowed.

The spacious cockpit seems all the more so by virtue of sitting in a glass cage. The greenhouse effect is a serious consideration in the Optica, especially on long patrol missions. Tinted glass overhead and air conditioning, which

are options, would seem to be musts.

The hand brake is easy enough to use but precludes differential braking for ground handling. The short nosewheel is mounted directly below the pedestal, offset from the centerline of the airplane, so that right turns take up more tarmac than left-handers. The short coupling of nosewheel to pedals makes for sensitive steering on the takeoff and landing roll.

The propeller, which the flight manual refers to as a fan, emits a high-pitched whine and responds instantly to changes in power. A fine touch on the throttle is desirable.

The low-slung picture-window cockpit contributes to some interesting sensations, such as watching the runway centerline whiz by inches below the heels of your shoes on takeoff, or adjusting pitch on climbout without a nose to use for reference. Helicopter pilots will be at home immediately. The rest of us will swallow hard a few times until gaining our sea legs. Landings can be especially sporting. One has to resist the urge to arrest the descent at treetop level to avoid the onrushing runway, and instead gently milk the airplane down to the proper flare height with the runway a couple of feet below the bubble.

The Optica's climb and cruise performance is tepid at best. Climbing out at 75 KIAS, three knots faster than best rate of climb speed, the VSI registered about 400 fpm. Cruise speed at low altitude and 75-percent power is 100 KIAS. Considerable frontal drag is the obvious culprit here, but there are other factors affecting performance. Flaps inboard of the twin booms are permanently fixed at 10 degrees extension to lower the stall speed, and some propeller efficiency is sacrificed for simplicity by using short, fixed-pitch fan blades. Besides, brisk climb and a fast cruise are frills in an airplane intended for low and slow observation work.

OA7 Optica Scout
Base price: approximately $200,000

Specifications

Powerplant	Lycoming IO-540, 260 hp @ 2,700 rpm
Recommended TBO	2,000 hr
Propeller	Brooklands EA7 A51-803, five-blade, fixed-pitch fan
Recommended TBO	1,000 hr
Length	29.75 ft
Height	7.58 ft
Wingspan	39.33 ft
Wing area	170.5 sq ft
Wing loading	17 lb/sq ft
Power loading	11.2 lb/hp
Seats	3
Cabin length	8 ft
Cabin width	5.5 ft
Cabin height	4.42 ft
Empty weight	2,090 lb
Max ramp weight	2,900 lb
Max takeoff weight	2,900 lb
Useful load	810 lb
Payload w/full fuel	510 lb
Fuel capacity, std	67.6 gal (66 gal usable) 405 lb (396 lb usable)
Oil capacity	8 qt
Baggage capacity	66 lb

Performance

Takeoff distance, ground roll	1,082 ft
Takeoff distance over 50-ft obstacle	1,584 ft
Max demonstrated crosswind component	25 kt
Rate of climb, sea level	810 fpm
Max level speed, sea level	115 kt
Cruise speed/range w/45-min rsv, std fuel (fuel consumption)	
@ 70% power, best economy	103 kt/410 nm
2,500 ft	(66 pph/11 gph)
@ 50% power, best economy	86 kt/520 nm
2,500 ft	(48 pph/8 gph)
@ 40% power, best economy	70 kt/570 nm
2,500 ft	(42 pph/7 gph)
Service ceiling	14,000 ft
Absolute ceiling	16,000 ft
Landing distance over 50-ft obstacle	1,820 ft
Landing distance, ground roll	912 ft

Limiting and Recommended Airspeeds

Vy (best rate of climb)	72 KIAS
Va (design maneuvering)	113 KIAS
Vfe (max flap extended)	90 KIAS
Vno (max structural cruising)	110 KIAS
Vne (never exceed)	140 KIAS
Vs1 (stall, clean)	58 KIAS
Vso (stall, in landing configuration)	51 KIAS

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted. □

Springs in the aileron control system impose relatively heavy stick forces. The airplane is sluggish in roll, but once a bank attitude has been set, the wings will stay put. Lateral stability is assured for patrol work involving turns at low altitude. Unfortunately, the Optica is not equipped with electric trim, and the trim wheel and indicator are in an awkward position on the center console. Electric trim would be especially welcome to counter the heavy nose-down pitch that accompanies deployment of the Fowler flaps outboard of the booms. Flaps extend to 50 degrees maximum.

The utilitarian beauty of the Optica became apparent during an impromptu mock spying mission. We targeted a "suspicious" 18-wheeler on the highway below and set up the Optica for surreptitious formation on the truck: 1,000 feet agl, takeoff flaps, power back to maintain 65 KIAS, and nose-up trim to hold altitude. We droned along at the truck's 4:30 position on the driver's blind side, alternately drifting toward and away from the truck to maintain constant spacing. The Optica was stable, quiet, and in all likelihood, the trucker was oblivious to its presence.

The Optica offers crystal-clear vision as is, but has the potential for more. The cockpit's visibility, spaciousness, and absence of vibration make it an excellent platform for electronic surveillance. Brooklands' sales literature shows an Optica dressed for police work. The cockpit is stuffed with a thermal imaging infrared camera that peers through a port in the floor, a video camera that transmits images to a ground vehicle, a searchlight mounted in a special pod protruding from the nose, loudspeakers, and an assortment of monitors, radios, and tracking devices. Thus outfitted, the unblinking, all-seeing Optica becomes a formidable and penetrating Cyclops in the sky. □