

March 2003

# ***Pilot***



**Robinson R44**

**Raven II**

*A stylish, fast and comfortable addition  
to the Robinson range.*





**T**HE RAVEN II LOOKED very smart indeed in its livery of red and blue, parked at Sywell. It was on a pad outside Sloane Helicopters which has a new business aircraft centre at the airfield. Starting my walkround, I noted the differences compared to other R44 models. There are the noise-attenuating blade-tip caps on both main and tailrotors and also the wider chord main blades.

In the cabin, the engine starter has been repositioned from the magneto key switch and is a press button located at the forward end of the collective lever, adjacent to the governor switch. There is also a secondary starter button, on the pilot's cyclic, above the handgrip, where it can be operated by the pilot's right forefinger. This is for use in the event of carrying out an engine air start. The mixture control is placed horizontally on the console, above the radio installation. There is

the noticeable absence of the carburettor heat control and its associated gauge—an item impressed very strongly indeed on the minds of all Robinson pilots during their training.

My first flight would be to Peterborough Conington, some fifteen minutes flying time to the east—we'd be accompanied by another R44 that would carry our photographers.

I strapped into the right-hand seat, alongside Alan Runciman, who carries out Sloane's flight-testing of Robinson helicopters. As we ran through the pre-start checks, Alan pointed out the differences on the instrument panel and console, compared to the earlier Raven.

There is now a carbon monoxide warning light—the sensor is in the heater duct on the pilot's side. Turning the master switch *On*, the warning light flashes twice and stays out.

In the event of it being unserviceable, the light will flash continuously. Beneath the main bank of warning lights is the auxiliary fuel pump light. Checking further down to the centre console, I noticed that the datcom is now mounted forward and to the left of the engine instruments, which I found easier to read. The key switch for the dual magneto system has an extra position, marked *Prime*. Interestingly, the Raven II is now single key operation—just like most modern cars the ignition key also locks the two front cabin doors.

Starting is straightforward. First, turn the magneto switch to *Both*, push mixture control in, and turn the key to *Prime* noting that the auxiliary fuel pump light goes out as soon as the *Prime* selection is made, and hold for 3 to 5 seconds. Turn the key from *Prime* back to *Both* and pull the mixture control fully out. Check the throttle is fully





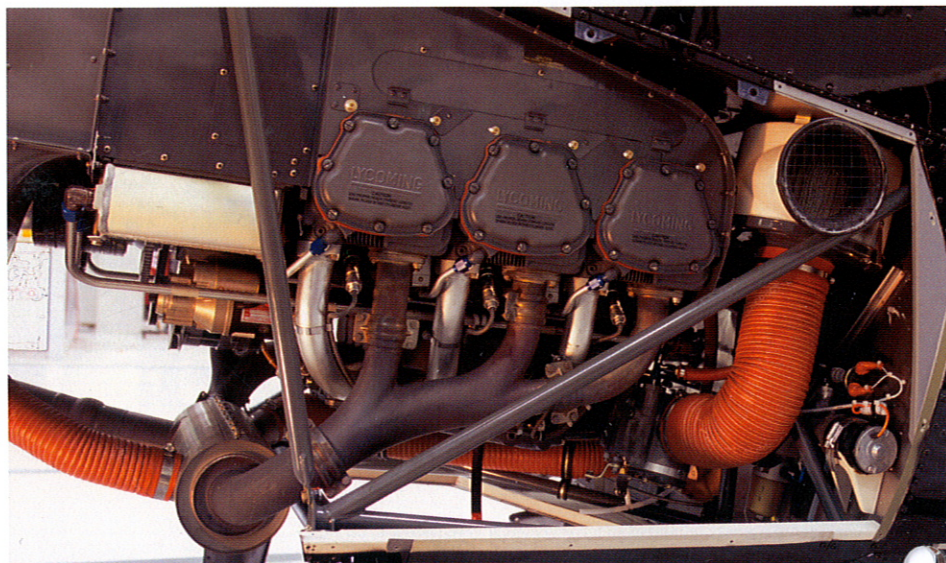
closed before pressing the starter button on the collective. Immediately the engine fires, push the mixture control fully in and turn the clutch and inverter switches on, maintaining engine rpm between 50 and 60 per cent until the clutch light goes out. Once the clutch light has gone out, increase rpm to between 65 and 70 per cent for warm-up.

Whilst waiting for the cylinder head temperature to move into the green, turn on the radio, GPS systems, navigation lights etc, also checking the hydraulic operation by switching the *On* to *Off* briefly, feel the control movement, and switch back to *On*. G-HRPN is very well fitted out, with two GPS systems—a Garmin 430 as well as a Skymap III, with the Skymap taking its signal from the Garmin 430 external aerial.

Continuing with the run-up, once the engine instruments are all comfortably in the green sector, increase power to 75 per cent ➤







**Above left:** no bulkhead between front and rear seats ensures good visibility for all occupants. **Above right:** Lycoming 10-540 now fuel-injected. **Top left:** outer casing on Skymap III helps to reduce glare. Central cyclic stick is common to R22.

and carry out the magneto drop checks, quickly closing the throttle to check that the main rotor and engine rpm needles split accordingly. Match the needles again, bringing the power back up to 70 to 75 per cent and switch the governor control to *On*.

This will bring both the engine and rotor rpm into the operating range. One final check, to make sure that both the low rotor rpm warning horn and light are functioning OK—back off with throttle slightly and slowly increase collective.

Lowering the collective, and back on with power, we are almost ready to go. Our accompanying R44 had already lifted off. A final quick check to see everything was in the green and all warning lights out, and then we lifted into the hover.

### Power play

My initial feel of the aircraft was that there was so much power available. I noted that

with two up (and I am no lightweight), and both fuel tanks indicating three-quarters full, we were only pulling 19 inches manifold pressure.

Moving away from the concrete onto the grass, I carried out a 360° turn to the left and the helicopter felt very stable indeed. I immediately felt very much at ease.

The lead aircraft was climbing quite quickly. I applied extra power and we simply shot up to his level and discovered we were rapidly overtaking! Easing back on the power, I practised some formation flying—fun, but some time since I had last done any!

The Raven II was very responsive to my control inputs and handled very smoothly. I felt it was quieter than previous R44s I had flown.

Arriving at Conington, I allowed the other R44 to fly ahead. This gave me time to look at the two GPS systems. I noted that the Skymap III, installed as normal on top of the

instrument panel, is fitted inside an outer casing which helps to reduce any unwanted glare—apparently a Sloane Helicopters design. A good idea—but not enough sun to put it fully to the test on this flight—nevertheless, it certainly improved the clarity and our position showed clearly on the display.

The Garmin 430 is installed at the base of the console, under the Bendix/King KY 196A comms unit. It gives an excellent colour display, but I found it a little difficult to see the moving map clearly as it's partly obscured by the central cyclic stick—I feel sure that with practice it wouldn't prove too much of a problem.

We parked the helicopters on the grass in front of Conington's smart clubhouse, and went through the shutdown procedure; this is straightforward and hasn't changed. Switch off the governor and reduce power to 70 per cent, wait until the CHT drops below 300°,





Ian Davies/Brian Barr (Pilot magazine.)

**Above left:** there are noise-attenuating blade-tip caps on both main and tailrotors. **Above right:** main panel difference for Robinson-trained pilots is the absence of a carb heat control and gauge. Engine start is now a separate button, rather than magneto switch. A big plus is single-key operation.

close throttle completely, clutch out, wait a further thirty seconds or ideally until you see a needle split, then pull the mixture control fully out. After the engine has cut, wait another thirty seconds before gently applying the rotor brake. Finally, ensure all switches are off before vacating the aircraft.

Our next flight gave me plenty of handling practice, hovering over one of Conington's three runways and manoeuvring for the benefit of the photographers in the back of the camera ship, with both its rear doors removed. The plan was to go on to Grafham Water, some ten miles to the south.

I really got the feel of this aircraft, both in the hover and in a series of transitions, increasing speed down the runway (beneath the camera ship) and then coming to a quick stop both into- and downwind. The aircraft performed superbly with so much power in hand. It really was beautiful to fly.

At Grafham Water, I was to fly around the

edge of the lake at 500 feet and seventy knots, coming to a hover at 500 feet, facing the lake and into wind. I slowly decreased speed, at the same time increasing power and we smoothly came to a hover, noting that we were pulling only 21 inches manifold pressure—this with two up, half fuel and 3°C OAT. The handling felt very good.

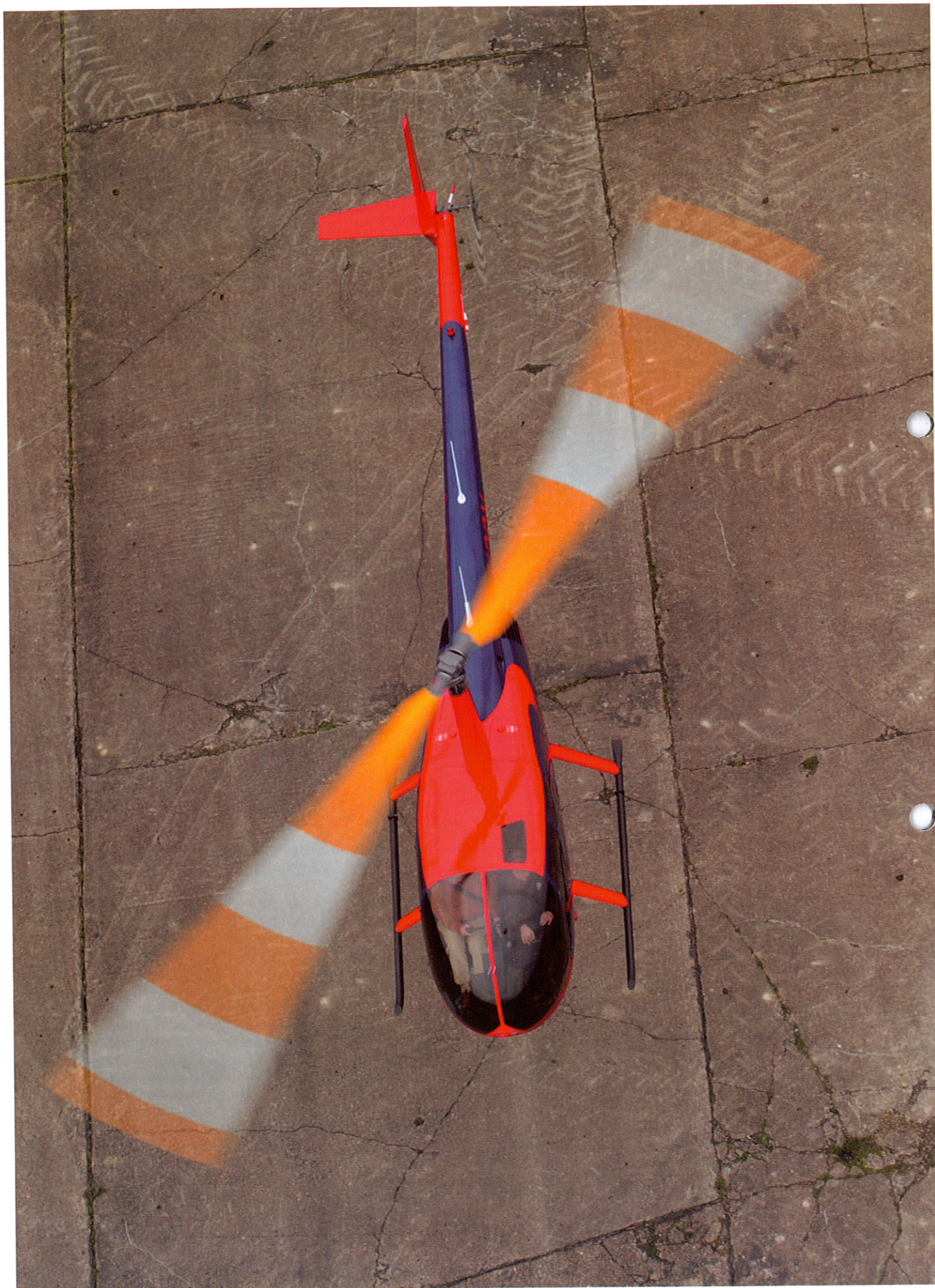
We returned to Conington, the camera crew thawed out over tea, and with the rear doors back on the other R44 it was time to return to Sywell. This was the ideal opportunity to increase speed to  $V_{ne}$ . We swiftly reached 130 knots. We maintained this speed for a few moments before reducing power. There was absolutely no vibration at all, with all controls feeling fine.

Discussing various operating figures and power settings with Alan, he mentioned that on a previous air test, with an auw of 2,490 lb, he had maintained 110 knots whilst pulling only 21 inches manifold pressure. The

max auw of the Raven II is 2,500 lb. On the C of A certification air test, which he had completed earlier in the day, with the aircraft weighing 2,275 lb he had achieved a rate of climb of 1,100 fpm, and on another air test with the aircraft weighing 2,050 lb and the OAT reading -2°C, he had carried out an autorotation. With collective lever fully down and throttle closed, he maintained 70 knots and 107 per cent rrpm. His comments were that the aircraft handled smoothly.

I decided to try an autorotation myself. With a quick check at the Ts and Ps, and a check below to ensure all was clear, I lowered the collective. Reducing the speed to 70 knots and careful to note that I didn't exceed the rotor speed, the aircraft comfortably settled into a descent. Recovering at 500 feet just short of the airfield boundary, and carrying out final check that everything was in the green, I reluctantly began a final approach onto one ➤









**Above and left:** Raven II has looks 'to grace any lawn or landing pad at a luxury country hotel', and costs about the same as a 25-year-old JetRanger. These photos shot at Conington, courtesy of Conington Flying Club.

of Sloane's landing pads, just as the winter daylight was beginning to fade.

### Grace your lawn

Going through the shutdown procedure, I thought back over these most enjoyable flights. The Raven II is a fast and powerful addition to the Robinson range of helicopters.

This aircraft is fitted with a completely new IO-540 fuel-injected Lycoming, designed in conjunction with Robinson exclusively for the Raven II. The engine is derated to 245 hp for five minutes, and 205 hp continuous. This allows an increase in gross weight of 100 lb and increased IGE and OGE hover ceilings. The new Raven is fitted with a 28 volt, 70 amp electrical system. The main rotor blades have a new surface area for increased lifting capability at altitude—and due to the redesigned main and tailrotor blades, it is quieter. Customers operating at high altitudes in hot temperatures are certainly going to be interested.

It is often said that the R44 is an ideal four-seat helicopter to fill a gap for the private owner between the R22 and the JetRanger. This may have been so with the earlier R44s, but from my own experience (with over 4,000 hours on JetRangers), I'd prefer flying this new model R44 to the JetRanger—it is faster, more comfortable, has much better all-round vision (especially for the rear-seat passengers), new design technology, is economical to operate and looks good. It will certainly grace any lawn or landing pad at a luxury country hotel.

In my opinion this represents very good value against, say, buying a 25-year-old JetRanger for a similar sum. You are buying a brand new aircraft with full warranty set against a machine with varying component times remaining, which can prove very expensive indeed should you be unfortunate enough to get a 'hot start'.

The Raven II comes with twelve-years or 2,200 hours to complete overhaul. On reaching full overhaul time it can either be returned to the Robinson factory at Torrance, California, or to Sloane's Sywell facility—they are fully authorised by the factory to complete this overhaul—following which the aircraft is once again issued with a brand new warranty. A customer buying a new R44, or indeed any Robinson machine, can pretty well calculate what the operating costs are going to be over a planned period, including allowing for anything more major.

A number of companies in Europe are actively looking at changing over from using single-engine turbine helicopters and turning to the R44. It can fill many roles, ranging from corporate use, pipeline survey work and so on. Another possible use that comes to mind is police air support. I know that the police favour twin-engined machines because they have to operate over towns and cities, however, especially in cases where two or three counties may share a police helicopter, a role-equipped Raven II could be cost-effective for a number of tasks such as motorway patrol and vehicle pursuit.

Modern piston engines are already very reliable—this reliability is increased even further by the fuel injection system fitted to the Raven II, obviating the risk of carburettor icing.

Summing up, I feel that the new R44 Raven II is a continuing success story for Frank Robinson and his team back in Torrance. It is an excellent helicopter with a great future. ✚



## Robinson R44 Raven II

### Dimensions

Main rotor radius	16 ft 6 in
Length, overall	38 ft 3 in
Length, cabin screen to tail	29 ft 5 in
Height	10 ft 9 in
Width	7 ft

### Weights & loadings

Empty weight	1,506 lb
Gross weight	2,500 lb
Useful load, standard fuel	810 lb
Useful load, with aux fuel	700 lb
Standard fuel	30.6 usg
Auxiliary fuel	18.3 usg
Max power loading	14.03 lb/hp

### Performance

Vne	130 kt
Cruise @ 2,200 lb TOGW	117 kt
Climb @ 2,500 lb/6,000 ft	1,000+ fpm
Ceiling	14,000 ft
HIGE @ 2,500 lb	8,950 ft
HOGF @ 2,300 lb	7,500 ft
HOGF @ 2,500 lb	4,500 ft
Range, no reserve	348 nm

**Engine:** Lycoming IO-540 fuel-injected piston, producing 205 hp max continuous (245 hp for five minutes).

**Manufacturer:** Robinson Helicopter Company, 2901 Airport Drive, Torrance, California 90505, USA. Tel: 00 1 310 539 0508; fax: 00 1 310 539 5198; web: [www.robinsonheli.com](http://www.robinsonheli.com)

**Test aircraft supplied by:** Sloane Helicopters, The Business Aviation Centre, Sywell, Northampton NN6 0BN. Tel: 01604 790505; fax: 01604 790988; web: [www.sloanehelicopters.com](http://www.sloanehelicopters.com)

The author thanks the aircraft's new owner, Richard Harpin, for the loan of G-HRPN for this flight test.

**Price:** \$335,000 ex-factory, basic price pre avionics.





Above: Mike Green, right seat, runs through the shutdown procedure—switch off the governor, reduce power to 70 per cent, wait for CHT to drop, throttle closed, clutch out, pause 30 seconds and pull the mixture out.

## Basic bubble to creature comforts

**T**HE R44 WAS a natural progression for Robinson, an uncomplicated, four-seat, fast, economical helicopter, to produce alongside their extremely successful R22.

Frank Robinson knew that he would have a great market. He started the design work in 1986. The prototype first flew in 1990 and the aircraft obtained FAA certification in December 1992.

The production model was called the R44 Astro. The first imports into the UK arrived in early 1994 and immediately proved popular with private owners. It is sleeker than the R22—which helps with its speed—and is powered by the well-tried Lycoming O-540 six-cylinder, naturally-aspirated engine, which has an excellent reputation for reliability.

Robinson's unique dual cyclic T-bar had been retained, likewise the R22 instrument layout, which makes it familiar to the pilot converting from the R22. The earlier Astros were fitted with an electronic auto-trim, operated by a 'coolie hat' control on the cyclic, which in turn actuated a trim system involving the use of four springs and two electric motors. It certainly assisted in dampening the pressure felt from cyclic loads, but was far from ideal in the long term, due to the inherent stick shake.

Robinson finally developed his own hydraulic system, which acts on the cyclic and collective controls. This transforms the R44 into a totally different machine, and a serious contender

to the JetRanger. It was immediately apparent that vibration levels had been reduced dramatically, with the aircraft becoming very smooth to handle. The installation of a hydraulic control kit became an optional fit on all new aircraft in 1999, costing an extra \$13,000 and the aircraft became known as the R44HA Astro.

Naturally, there was no longer a market for non-hydraulic machines, so the Astro helicopter was renamed the Raven and introduced with hydraulic controls as standard. It has a distinctive aerodynamic design, adding to the high speed with an average fuel consumption of only 12 to 16 gph. The comfortable cabin offers 2+2 seating, with no bulkhead between the front and rear seats—this assures excellent visibility and panoramic views for all passengers. All these make the Raven a very attractive aircraft indeed.

The R44 Raven is available in several optional utility configurations including a 'Newscopter' fully fitted out with news-gathering equipment, and a police helicopter, again fully role-equipped—but these have not been sold in the UK due to twin-engine requirements. There is also the R44 IFR Trainer, and the Clipper, which is float-equipped, either with fixed or pop-out emergency floats.

The new R44 Raven II costs \$28,000 more than the original Raven, which remains in production—more than a thousand R44s have rolled off the production line at Torrance.