The Osprey is largely composite, but of con-ventional "skin and stringer" construction

support. The Lehman requirement for 350 anti-submarine-warfare (ASW) versions of the aircraft to replace the S-3 Viking has been dropped for the time being, because of budget constraints, but may well be reinstated once the Osprey proves itself in other roles (the aircraft is seen by many as an ideal ASW platform). Principal mission requirements are to carry a crew of five, rescue four people within a 460 n.m. radius, and hover at 3,O00ft/91-5°F for 15 minutes.

The US Army's aviation plans remain in turmoil and, at the time of writing, its requirement for 231 Ospreys in Marine Corps configuration had been dropped owing to budget constraints. "They'll be back" was an oft-stated opinion heard by Flight.
Current plans foresee production build-ing up to a maximum of 11 aircraft a month after four years. Acquisition strategy calls for the first eight V-22s to be produced under the same workshare as the development aircraft—Bell wings and nacelles, Boeing fuselages. Each company will then build two complete aircraft, after which they will compete annually for production.

With a range of 2,100 n.m. (into a 20kt headwind), the Osprey will be self-deployable worldwide without flight refuelling, and therefore will be capable of flying non-stop from the west coast of America to Hawaii. For such missions, two rigid tanks containing 16,0001b of fuel will be installed in the cabin, bringing total fuel carried up to 29,6501b. This means that Ospreys will not have to be carried around in big transport aircraft such as the C-5, as large helicopters are today, saving both space and reassembly time on arrival.

In aeroplane mode the Osprey will cruise at 275kt, and (like the XV-15) will have a 300kt-dash capability. In helicopter mode, a maximum forward speed of lOOkt will be possible, and 30kt in sideways or rearward flight.
The normal mission weight of an Osprey is 42,0001b, while Vtol maximum gross weight is 47,0001b. Tilting the rotors forwards for a short take-off (around 500ft) increases capability to 60,5001b.

Boeing Vertol is responsible for building the fuse-lages of development and initial production V-22s

Cabin equipment includes a 2,0001b-capacity hook and winch system and stow-able roller rails. Internal payload capacity is 10,0001b, the 24ft by 6ft2

cabin space
providing enough room for a Jeep or a single F100 fighter engine (the Hummer high-mobility wheeled vehicle, because of its width, does not fit inside a V-22).
Two external hooks can lift a total of 15,0001b between them, or 10,0001b each. Recent windtunnel testing has shown that the Osprey will be able to transport stabilised loads (such as the Hummer) at up to 195kt, which will help to improve payload productivity on the battlefield. Stowability was a key feature of the Osprey design, since to suit the Navy it had to be accommodated on board LHA amphibious assault ships, which dictated wingspan, rotor size, and undercarriage dimensions. In stowed configuration on a full-sized aircraft carrier the Osprey is actually narrower than any other aircraft in the carrier inventory, with a width of just 17-3ft.

Rotor and wing stowage is a three-part operation, beginning with braking and indexing of the rotors so that they can be folded inboard. Next the nacelles are lowered, which places the blades parallel

The second V-22 is being built, and will fly, at Boeing Vertol

to the wing leading edge. Finally the wing, which is mounted on a 90in-diameter stainless steel ring, is rotated in line with the fuselage (the dip in the rear fuselage accommodates the rear pylon).
It is an inescapable fact of tilt-rotor aircraft that both rotors must remain powered if one engine stops. The Osprey will therefore be the first twin-engined, fixed-wing production aircraft fitted with cross-shafting to ensure that both rotors can be driven from one engine. The system was well proven during XV-15 flight test-ing, where engine governors failed on two occasions without the aircraft crashing (an event which would probably have terminated the tilt-rotor programme). It was also frequently demonstrated to guest pilots, when one engine was often shut down without the pilot noticing.

Because of the cross-shafting arrange-ment there are five main gearboxes on the V-22, two in each nacelle plus the mid-wing gearbox. At the forward portion of each nacelle is the prop-rotor gearbox. Power from the engines feeds into an input shaft at the bottom of each gearbox, driving the rotors through a set of reduc-tion gears. These gears also drive a second shaft that leads from the top of the gear-box, back along the nacelle, to the tilt-axis gearbox, located on the pylon's axis of rotation.

Engine power is then directed, through
a series of interconnecting carbonfibre shafts, down the wing trailing edge to the mid-wing gearbox. This carries many of the accessory systems, such as the auxiliary and environmental power units, constant-frequency generator, rotor brake, and hydraulic pumps (the Osprey has a 5,0001b/in2

hydraulic system).
While the XV-15 was constructed entirely from metal, more than 70 per cent of the V-22's 12,5001b structure is built from composite materials, the fuselage being almost entirely made from carbonfibre epoxy. While the proportion is higher than in the Beech Starship, and
even than in the Advanced Tactical
Fighter (which is about 50 per cent
composite), this is not as risky as it
sounds. Experience with composites is
building up rapidly, and large primary

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