The tilt-rotor Osprey will give the Special Operations Forces the range to reach far into enemy territory.

When the CV-22 finally reaches Air Force Special Operations Command, it will do more than simply replace some aging aircraft. It promises to transform the way AFSOC operates and how it thinks about its mission. In fact, the Osprey’s impact might be felt beyond the Special Operations Forces.

The CV-22 is the Air Force version of the new Osprey tilt-rotor, an entirely new breed of aircraft that is neither pure airplane nor pure helicopter but has features of both. The Osprey takes off and lands like a helicopter, lifted by two huge rotors on the tips of its wings. Once in flight, the rotors can tilt forward, turning the aircraft into a high-speed turboprop.
Over the years, many have attempted to develop such a hybrid, but the Osprey is the first aircraft offering sufficient reliability and utility to be of practical military value. The aircraft is about half the size of a C-130 transport.

The rotors can again be tilted toward 90 degrees for either a vertical landing or a rolling landing if it is heavily loaded. The Osprey will be able to take off and land within the exact same space as the H-53 Super Jolly series of helicopters it will replace and do it more stealthily and quietly than any previous large rotorcraft.

Assuming that it successfully completes its flight test program—and all signs are that it will—the aircraft will begin operational Air Force service in about five years. Military leaders expect the Osprey to remain in the inventories of at least three US armed services halfway into the next century.

“This aircraft is so revolutionary, ... we have no idea of [its] boundaries,” said Air Force Lt. Col. Jonathan Jay, CV-22 program manager. “This aircraft is going to have capabilities that we’re [now] unaware of.”

The Osprey is being developed by a contractor team of Bell and Boeing, under the overall direction of the Marine Corps. The Corps has a desperate need to replace ancient CH-46 Sea Knight helicopters, many of which are already five years beyond their planned retirement points. The Marine Corps version, called the MV-22, will ferry troops, supplies, and small vehicles from amphibious assault ships to landing zones ashore.

The Marine Corps may have the lead, but the Air Force has viewed the Osprey, with its ability to fly fast and far and land vertically, as a natural for SOF activities.

**Resurrection**

Unlike helicopters, the CV-22 won’t need to be disassembled and loaded into a large cargo jet to get overseas; with a single refueling, it will be able to self-deploy and fly 2,100 nautical miles on its own to get to the action.

It will also be able to fly from a ship or forward staging area over a distance of 500 nautical miles with 18 troops and then return without need of refueling. Indeed, it was largely on the strength of the V-22’s promise as an SOF platform that Congress forcibly resurrected the program in 1989. The Pentagon canceled it to save money, but lawmakers demanded its return to the defense program.

Current Air Force plans call for the service to acquire 50 CV-22s. USAF will piggyback on the Marine program, paying only for the aircraft it buys and for the development of the special features the AFSOC version will require.

These features include extra fuel tanks in the wings, terrain-following and terrain-avoidance radar, a more detailed digital map, an in-flight refueling probe, and the Suite of Integrated Radio-frequency Countermeasures, or SIRC. The USAF model will also have additional “buckets” of chaff and flares as well as two additional radios. Later in the program, a gun will be added as part of a preplanned product improvement program.

The Navy, too, will buy a search and rescue and utility version called HV-22, but the 48 aircraft it has in mind would come at the end of the V-22 production run. The V-22’s wings rotate and its rotors fold for compact stowage aboard ship. All
three types will come with a forward-looking infrared system.

Today, the Army is the only US armed service that is not involved in the program. It formerly was a partner with the other services, and it viewed the V-22 as the eventual replacement for the aging CH-47 Chinook helicopter, but it bowed out in the 1980s because it lacked the money for a long-term effort.

In Air Force plans, the CV-22 is earmarked for what AFSOC calls the “long range covert-penetration” mission. The mission is handled today by the MH-53J Pave Low III helicopter, a heavily modified version of the H-53 series designed in the 1950s. The Pave Low III is used to fly at treetop level or lower to get commandos deep inside enemy territory and out again. It can carry small vehicles—jeeps, motorcycles, or all-terrain vehicles—and operate in all types of weather.

However, the Pave Low lacks long range. For most missions, it requires multiple refuelings from another AFSOC aircraft, the MC-130P. The introduction of the 50 CV-22s will give the force the long legs it always has lacked and, at a stroke, will permit the Air Force to retire 80 AFSOC aircraft—Pave Lows, tankers, and some MH-60G Pave Hawks, which complement the Pave Low but lack its lifting power or range.

Deep and Dark

The long-range covert-penetration mission is an important one, having unique requirements. To do it, AFSOC forces operate “in the hours of darkness,” Jay said, noting, “That’s when we operate very well and our adversaries tend not to.”

Operating in nighttime darkness, Pave Lows and Pave Hawks find holes in an enemy’s radar coverage, slip through, and go to the objective over the path least likely to attract attention. Refuelings—performed in blackout conditions at breathtakingly low altitudes—are inherently risky.

For very long missions deep inside enemy territory, the aircraft have to hide during the day, continuing their mission at night. It is not easy to keep these machines under wraps. With their array of extra tanks, FLIR turrets, radomes, infrared countermeasures, antennas, and other gadgetry, the SOF choppers are unlikely to be mistaken for civilian aircraft, even at a distance.

Air Force special operators have concluded that the CV-22 will vastly simplify the mission. It offers “double the radius and double the speed” of the MH-53J, Jay noted, adding that this adds up to “doing things faster, without refueling, and offering us more flexibility” to undertake missions previously considered not feasible or simply out of range.

Jay cited a case in point: Operation Eagle Claw, which is better known as Desert One, the disastrous 1980 attempt to rescue US hostages held in Iran.

“If you recall Desert One,” Jay said, “that operation was to have taken a couple of days,” including on-ground and aerial refuelings, as well as daytime hiding layovers. With the CV-22, he said, AFSOC could do the entire mission “in one night.”

The Osprey could fly at 300 knots and even incorporates some stealth features, such as infrared suppressors on the exhausts.

“The single greatest advantage” of the CV-22, Jay said, is its range. “We could take a 10-man team 700 miles in, 700 miles out, [and] drop them off, ... and that’s all in the hours of darkness; ... whereas before, if we did that with a helicopter, it would take at least three or four air refuelings, [and] probably a full day. ... That’s the quantum leap, here.”

Combining the speed of a turboprop with the attributes of a helicopter also adds mission flexibility in other ways, Jay said.

“If we need to go somewhere really fast, we can do that. If the mission calls for ... going really low and slow, we can do that, too.” While the CV-22 will have the inherent capability for “slung” loads like its Marine cousins, AFSOC doesn’t plan to use it in that configuration.

Jay noted, moreover, that the CV-22 will give Air Force SOF crews a highly upgraded, sophisticated electronic warfare suite. “If we do go in harm’s way, it gives us a much better potential of getting out safely,” he said.

Flying Armor

Officials also cite the aircraft’s inherent battle-worthiness. To keep its exotic technology flying in the event of a system failure or hostile fire, Osprey’s designers made its systems redundant, separated, and in some places, armored. One engine can power both rotors if necessary, thanks to cross-shafting between them. The composite materials can absorb the hit of a bullet and not crack. The seats and some parts of the cockpit are also armored.

The Air Force will put into the CV-22 a flight crew of three—pilot, copilot, and flight engineer. The service has not yet decided which of the three will be designated to use the Osprey’s chin-mounted gun. “I think it may be that ... depending on where they are in the mission, it might be
Looking like a Rube Goldberg special, the MH-53J Pave Low III has been heavily modified with strap-on fuel tanks, terrain-following radar, night vision equipment, and countermeasures. The CV-22 carries this gear internally.

that any of the [three] could operate the gun,” Jay said.

The computer displays will update threats in near real time, offering the crew a chance to see in a 3-D display where they can safely fly. Should any of the multifunction displays fail, others will take over its task, reducing the risk of “flying blind” from a display failure or lucky hit. There are “no knobs” on the computers, Jay noted.

The CV-22 won’t be able to land like a conventional airplane, moving down the runway horizontally with engines tilted forward like propellers. The propellers are too big for this and would strike the ground.

Even so, each CV-22 will have a capability to make such a landing on a one-shot basis. The propellers are designed to break in a way that aids crew survivability, if such a landing were made in an emergency. The composite rotors, rather than breaking up into guillotine-like pieces of shrapnel, would simply shred into brittle filaments. The aircraft could, in an emergency, make an unpowered landing in helicopter mode; it has a limited ability to autorotate to a hard but survivable landing.

The Osprey can even fly backwards. The trick can be done by tilting the rotors past 90 degrees vertical. At this point, the power to fly backwards is more a quirk than a capability, but such maneuvers may someday yield a useful combat tactic for the special operators. Such characteristics will be explored during the Air Force’s Initial Operational Test and Evaluation effort.

On the CSAR?

The revolutionary Osprey is being considered for another important Air Force mission—Combat Search and Rescue. Today, the Air Force meets this requirement with a force of MH-60G helicopters. Officials note that the Air Force has not changed this situation and at present plans to continue using MH-60s for the task.

Even so, change may well come. Brig. Gen. Richard L. Comer, deputy assistant secretary of defense for policy and missions, ASD for Special Operations and Low Intensity Conflict, recently told a Washington audience that the CV-22 offers too many advantages in CSAR work for the Air Force not to buy it, eventually, for that purpose.

In CSAR, Comer said, “The critical element ... is time,” since there may only be a few minutes in which to rescue a downed crewman who is either badly injured or facing imminent capture. The CV-22, he said, is a “deep battle machine.” That fact dovetails with the Air Force, he said, because USAF is “culturally ... a deep battle force.”

At present, Air Combat Command manages the CSAR mission, with its equipment falling under ACC purview. According to Comer, the CSAR and SOF communities “often don’t communicate well when it comes to planning requirements and missions.” He speculated that CSAR operators are afraid that they will be “swallowed” by AFSOC.

Comer voiced his approval of the CV-22 for CSAR because it offers the opportunity to “go in high,” if such an approach would work better in certain missions. Also, he pointed out, the CV-22 can self-deploy to a far-forward base, whereas CSAR helicopters must be transported in a heavy airlifter like the C-17 or C-5, undergo reassembly at the destination, and then go through test flights before use.
Comer cautioned, however, that the purchase of CV-22s for the CSAR mission is still not in the Air Force’s plan. USAF also has not identified funds to apply to such a program.

Ever since the aircraft’s engineering and manufacturing development program got under way, developers have carried out simulations to improve the cockpit layout and arrangement of gear inside the aircraft for maximum efficiency and common sense, Jay noted.

“We’ve made lots of changes based on getting a real wide variety of crew members in [the simulator] from all different SOF backgrounds,” he said. “This airplane [has] the capabilities of a helicopter and the capabilities of a C-130, and we have inputs from both of those career fields to really understand how to maximize that system.”

Like a C-130, the V-22 has a rear ramp for loading vehicles and cargo. Like a helicopter, it has a rescue hoist, which is located inside the cabin to avoid drag and swings out in helicopter mode.

Jay added that “I think this [the extensive simulator work] is really revolutionary. It’s a huge step for us in maximizing our cockpit management system.” By that, he means that, when IOT&E gets under way with the real aircraft, endless notional rehearsals in the simulator will “put us way ahead of the game” and keep IOT&E more of a “validation” experience than a discovery period for making costly changes to the aircraft.

Air Force Chief of Staff Gen. Michael E. Ryan flew the V-22 in September and emerged pronouncing it “a very easy airplane to fly.” Ryan said he had no trouble adjusting to what he expected to be the tricky part of the flight—making the transition from helicopter mode to airplane mode. The left hand control is a throttle in airplane mode and functions like a collective in helicopter mode; on the right hand, the “stick” between the pilot’s legs functions as the cyclic in helicopter mode.

Jay noted that a small thumbwheel on the left hand “thrust control” lever controls the angle of pitch of the engine nacelles and permits the aircraft to safely go into many attitudes that would be a precursor to a crash in any other airplane.

The first CV-22s will reach AFSOC in 2003. In that year, USAF expects to have four aircraft at Hurlburt Field, Fla. The services will send their V-22 pilots to MCAS New River, N.C., for what Jay called “basic, 100-level training” in the airplane. After that, CV-22 pilots will train at Kirtland AFB, N.M., in the special missions and capabilities of the SOF version, and finally from there go to operational units.

The Air Force should be able to declare initial operational capability in 2004, when it’s expected that 10 aircraft will have been delivered. The full buy of 50 won’t be completed until 2012. That’s when the last MH-53Js will be phased out.

Jay said the Air Force is getting its money’s worth from the Osprey multiservice program. “This has been a very cooperative effort across the services, for the most part. You always have challenges in a joint program. Sometimes you have to pull teeth and sometimes you get so much,” but “I think right now we’ve got a very successful … effort.”

Flight testing is going well with the V-22. Built to last as many as 40 years, the V-22 will likely take on new missions, should it prove as versatile as expected. A civil tilt-rotor for intercity commutes is on the drawing board.

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