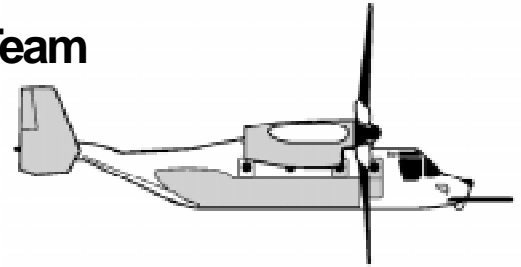


OSPREY FACTS



MV-22 Mishap Investigators Focus on Loss of Lift: Marines announce phased “return to flight” plan

HEADQUARTERS MARINE CORPS, Washington, D.C. (May 9, 2000) – (Reprinted with permission from HQMC Public Affairs press release.) Marine Corps officials said today that a phenomenon known as “power settling” is now the focus of their investigation into the crash of an MV-22 Osprey aircraft that killed 19 Marines April 8 in Marana, Ariz.

As part of a regularly scheduled Defense Department news briefing, Marine Deputy Commandant for Aviation LtGen. Fred McCorkle outlined what officials have learned since the accident. The general also announced a phased plan to resume flights of the MV-22 Osprey.

Following the accident, Marine Corps Commandant Gen. James L. Jones ordered an operational pause of all V-22 flight operations to allow investigators to analyze information provided by an onboard data recorder and to provide insight as to the cause of the accident.

Analyses of the data retrieved from the data recorder, called a Crash Survivable Memory Unit (CSMU), along with extensive engineering investigations have confirmed that all aircraft systems and software were operating properly at the time of the accident.

The data shows that in the last seconds of its flight, the mishap aircraft was in a high rate of descent at a relatively low forward

airspeed. These characteristics can lead to a condition known as power settling (or vortex ring state) which can result in a loss of lift on the rotor system. Power settling is a phenomenon common to helicopter flight.

Officials continue to look at other possible causes such as settling with power and the effects of operating two aircraft in close prox-

imity to each other in flight.

A thorough review by the Naval Air Systems Command, the Naval Safety Center and the Deputy Commandant for Aviation has found no structural or design flaws that preclude safe flight operations and the Marine Corps maintains complete faith in the safety of the V-22 aircraft.

As a result, Gen. Jones has lifted the temporary operational pause for instrumented models of the Osprey, known as Engineering, Manufacturing and Development aircraft, in the first of three phases in the resumption of flight of the MV-22. Developmental test pilots will continue to simulate and analyze possible causes of the accident.

Following continued analysis of flight operations and insights gained from further findings of the investigation, the Marine Corps will conduct a phased approach in its return of production MV-22s to flight status, initially with essential aircrew only, and eventually with passengers.

The MV-22 has safely flown more than 40 troop-lift missions and has carried more than 700 troops during operational evaluation flights.

To personally demonstrate his confidence in the MV-22, Gen. Jones plans to be aboard the first aircraft carrying passengers.

Marine Corps officials stressed the importance of informing the public about both the decision to resume flights and their commitment to the MV-22 Osprey aircraft.

They maintain the Osprey is clearly a much better, much safer, and much more capable aircraft than the Vietnam-era CH-46 and CH-53D helicopters that it will replace.



Army countermeasures leads CV-22 cost growth

By Adam J. Hebert, Inside The Air Force (Reprinted with permission from Inside Washington Publishers)

NAS PATUXENT RIVER, Md. (May 19, 2000) — More than \$1 million in cost growth for early lots of CV-22 Osprey tiltrotors is directly attributable to an Army decision to defer purchasing the ITT Suite of Integrated Radio-Frequency Countermeasures (SIRFC), V-22 officials said this week. The Army plan was to buy more than 1,000 units for Apache Longbow helicopters, but the service decided to delay the purchase until at least 2006, causing the Air Force to pay for the more expensive early SIRFC production units.

“The cost driver for CVs is SIRFC,” explained CV-22 deputy program manager Scott LeMay in an interview this week. But the service “moved those out” to at least FY-06, in the Army’s fiscal year 2002/2007 program objective memorandum, he said.

The Army is the lead service on SIRFC. Officials explained this week that CV-22 costs had increased by \$8.3 million each compared to estimates a year ago, while MV-22 costs for the Marine Corps had risen by about \$4 million. The program overall remains below the cost targets established at Milestone II, officials said — the cost growth is relative to more recent estimates.

“Now, we’re leading the learning curve, so our unit cost has gone up significantly for SIRFC,” V-22 Program Manager Col. Nolan Schmidt said. ITT has identified initiatives to lower unit costs and U.S. Special Operations Command has agreed to fund the cost-saving initiatives for SIRFC.

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Budget problems force restructuring of V-22 procurement strategy

Officials say quantities will be spread into later years

By Adam J. Hebert, Inside The Air Force (Reprinted with permission from Inside Washington Publishers)

NAS PATUXENT RIVER, Md. (May 19, 2000) — A combination of budget cuts, cost-saving measures that have not produced expected results and changes in the buy plan have pushed the V-22 Osprey above expected costs by as much as \$10 million per aircraft, program officials explained this week.

The annual purchases of both the Air Force CV-22 and Marine Corps MV-22 are expected to be reduced in the 2002 budget, while the total buy is spread out over more years. This raises CV-22 per unit costs to \$62.1 million, \$9.9 million above last year's estimate — but provides short-term financial relief for the program.

V-22 Program Manager Col. Nolan Schmidt told Inside the Air Force in an interview this week that, ironically, the Osprey remains significantly below budget overall. Costs have risen above expectations, forcing changes in the purchasing plans that were based on the old assumptions.

"Decisionmakers were thinking savings were accruing faster than they were, and reducing budgets faster than had been planned at Milestone II," Schmidt said. The new plan is to "reset costs back to where we thought they were."

The plan to buy 50 Air Force CV-22s for special operations missions by 2007 has been stretched to 2010, with the maximum annual rate falling from nine CVs to six. The six-per-year procurement rate will not begin until 2006, beyond the current future years defense plan. For a variety of reasons, the CV-22 is the variant most over budget, more than \$8.3 million above plans, prior to the change in the buy profile.

The cut in the buy profile served to add roughly another \$1.6 million to the CV-22 unit cost, according to V-22 spokeswoman Gidge Dady. In current year dollars, the recurring unit flyaway cost for CV-22 was estimated to be \$52.2 million in the FY-01 budget, and it has risen to \$62.1 million in the current estimate. New cost estimates for the other two variants were not available at press time.

The Marine Corps MV-22 is also being stretched out, with the buy profile being re-

duced from a maximum rate of 30 per year in the FY-01 budget, to a new annual rate of 24 for most years. The MV variant is also over budget estimates, but by only half as much as the Air Force's version.

The restructure is unrelated to the recent crash of an MV-22 that killed 19 Marines April 8. The budget problems and restructure were both being worked months before the mishap, Schmidt said.

Officials said the purchases are being deferred in each V-22 customer's fiscal year 2002/2007 program objective memorandum, but the restructure remains executable under the FY-01 funding plan already on Capitol Hill. The Air Force asked for long-lead funding in FY-01 budget request for four Ospreys to be delivered in 2003.

"Our costs today are within the threshold we were given at Milestone II," said Schmidt, when the target price was set at \$47 million per V-22 (recurring unit flyaway cost) in constant 1986 dollars. "We are at \$43 million; we are well underneath the threshold," he said, but the cost challenge is a budget issue.

"We had projected below our goal for cost," Schmidt said, and consequently several budget cuts occurred in the program, which the program office was forced to incorporate with less success than hoped. Two or three years in a row, "inflation cuts" were made by Congress, Schmidt explained, because of interest rates that were lower nationally than budget projections had forecast.

But inflation rates are still running at 6 percent for contractors Bell and Boeing, Schmidt said, not at the 2 percent national rate, and that is about the norm for the aircraft industry. And the cuts did not end there.

"When I take a budget cut, we soak up other cuts too," he said, because other programs could not take budget cuts, such as the C-17, which is being procured under a multi-year fixed price contract.

Then, into this environment, the program initiated a major change to flat-panel displays, a move that was intended to save \$1 million per V-22, and \$500 million across the program. This was in addition to other savings accumulating through a production "learning curve," Schmidt explained. The move to flat-panel displays was one of several changes being made to improve V-22 reliability rates,

which remain below standards (ITAF, March 31, p1). Most of the changes were to "low-tech" items such as fasteners, connectors or light bulbs.

The cathode ray-tube displays in the first three years of V-22 production were not up to the task, "and we modified that to the flat-panel displays that raise reliability by greater than a factor of 10," Schmidt said, while also decreasing weight by 60 pounds and saving money. Cathode-tube reliability "wasn't a problem in aircraft mode," but in helicopter mode the increased vibration caused problems. Flat-panel displays can withstand more vibration, "so technology has really helped us there," said Schmidt, a Marine Corps officer.

"I could accept large cuts" if the shift to flat-panel displays provided savings over and above the planned learning curve, Schmidt continued, but "that was a false assumption. When we took that \$1 million change, we were really just getting down to the planned learning curve," and it became clear program costs were not on track.

Reliability rates are slowly returning to the high standards set for them, Schmidt said. The V-22 fleet will meet threshold requirements by FY-01, he said, "which is a very tough threshold. I personally believe it is tougher than any other aircraft in the inventory."

This expected date will be two years ahead of the first USAF aircraft delivery.

"We had a threshold of 17 hours meantime between mission critical failure. That is the threshold [the director of operational test and evaluation] tells us to use as our primary threshold for reliability. We were at 18 hours going into our operational test," Schmidt said.

"That's the significant number that most people fail to understand."

Another key figure is overall meantime between failure, a figure for failure of any item, such as a light bulb, that can cause maintenance time but does not prevent the V-22 from completing its missions.

"That's the number [DOT&E] had the issues with," Schmidt explained. The Air Force, meanwhile, uses weapon system reliability as its key performance parameter — a figure closer to the mission critical stan-

V-22 deliveries extended over longer period

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ard. But the reliability for the CV-22 is “too early to track,” Schmidt said, because the CV missions have not been finalized yet.

The Marine Corps also announced this week that MV-22 slip rings were to be replaced before the aircraft returned to flight because an “uneven seal produces gaps that can permit normal wear debris to penetrate into areas that can lead to circuit path disruption.” The May 17 release described this as a precautionary measure that was not a factor in the April crash.

Despite the realignment, the overall procurement quantities of 360 MV-22s for the Marine Corps, 50 CV-22s for the Air Force, and 48 HV-22s in later years for the Navy remain unchanged.

The cost growth ended up being about half the responsibility of the Air Force and half the responsibility of the U.S. Special Operations Command. It was SOCOM that drove the decision to stretch the buy, officials said.

The arrangement for CV-22 is that the Air Force funds V-22-common equipment, but anything unique to the CV-variant is a SOCOM charge. Those upgrades include a terrain-following/terrain-avoiding radar, the electronic warfare suite, larger fuel tanks, and updated avionics.

“It was twice the price they expected to pay,” explained Maj. Scott LeMay, deputy program manager for CV-22 at Pax River.

Because SOCOM was only expecting to pay 15 percent of the total CV-22 cost, \$4.3 million in new charges per Osprey for the command was a major funding shock.

“It was much harder for them to pay the bill,” Schmidt said, and consequently, “the Air Force got the windfall of hundreds of

millions of surplus they could give to C-17, F-22” and other procurement programs, LeMay added.

However, “total cost, there’s no doubt, will go up. We aren’t buying as many per year, so we’re not getting the same price we would be getting,” LeMay said, raising the unit-price controversy that has plagued nearly every major weapons system acquisition that has seen its buy cut or delayed.



Artist's concept depicting CV-22 in combat rescue mission, recovering downed airmen at sea.

Schmidt said the optimal production number for all three V-22 variants would probably be 42 Osprey per year, but any production level increases would likely yield efficiencies for the program.

Air Combat Command is looking at the CV-22 as a candidate to replace its fleet of HH-60 helicopters the service has deemed inadequate for Air Force search-and-rescue missions (ITAF, March 10, p1). The service hopes to replace all 105 under-performing HH-60s by 2017, but if the CV-22 is recommended in the analysis of alternatives, V-22s would not be procured on a one-for-one basis, because of the greater capabilities of the Osprey.

The planned CV-22 buy will replace MH-53s for long-range SOCOM missions.

Another possible source of additional V-22 sales is the National Guard. Alaska, California, Minnesota and New York have all expressed interest in the tiltrotor for homeland defense missions, and the Navy announced in January that as many as 25 units could be purchased for these operations. Minnesota alone is looking to augment its Guard with up to 10 aircraft for homeland defense search-and-rescue.

An ACC or ANG buy “would help us,” LeMay said, because “to pay for the unit cost increase, we had to defer some support equipment into the outyears.”

Schmidt said a review is under way to find new cost saving initiatives for the program that will hopefully get the program back to its FY-01 cost projections. Of about 400 initial ideas, 100 are now under further analysis.

“All of which we believe will ensure we get to budget, in light of the escalation mismatch that we have. We’ll be very happy if we can show we can get down to budget, and I think we’ll do that,” Schmidt said.

The price delta will not go away on its own, however. “I don’t believe,” savings would catch up on their own, he said, although “there are some who do — but I don’t think so.” Those who are optimistic about the price reduction learning curve returning to the prior estimates are “not within Bell-Boeing,” either, Schmidt said.

The V-22 is expected to revolutionize rotary wing operations through its ability to take off and land vertically like a helicopter, but rotate its engine nacelles forward in flight to cruise like a turboprop aircraft, with greater range and speed than a helicopter.

for the Air Force variant “was a function of weight increase in CV-22 and low estimate of installation costs,” Schmidt explained. There is now a lot more wiring weight, and installation is more complex. For the CV-22, workers cannot “flat-pack” the wiring, as is done in the MV-22, making the wiring more difficult to install.

There was too much electromagnetic interference to execute the wiring in that manner, Schmidt explained, so the CV-22 will require assemblers to run individual lines instead.

“We’re kind of over a barrel,” he added, because it is far too late in the program to change the planned electronic warfare plans for CV-22.

SIRFC for CV-22 only

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SOCOM has responsibility for CV-specific modifications to the baseline MV-configuration, which will not use SIRFC. A variety of budgetary challenges have led SOCOM to lead a plan to draw-out the V-22 production plan, however.

According to ITT, the Army’s operational requirements document calls for the installation of the ALQ-211 SIRFC system on the AH-64D Longbow Apache, Special Operations MH-47E and MH-60K helicopters and designated UH-60 and CH-47 aircraft.

LeMay noted, however, that the Longbow

was to be the leader of the SIRFC procurement, and “the larger the market basket, the lower the unit cost.” He described SIRFC as being responsible for “at least a million [dollars] in cost growth.”

SIRFC cost itself hasn’t gone up much, Schmidt said, but the V-22 program is now “buying more expensive up-front units,” adding that hopefully, “the Army will see the light and put it on a lot of their airplanes — preferably before we finish all of our CV-22 production.”

Another \$1.3 million in unexpected costs

Canadians admire Osprey

By CHRIS LAMBIE
The Daily News

NOVA SCOTIA, CANADA (April 15, 2000) --It's a whirlybird, it's a plane, it's ... super-strange.

A V-22 Osprey, the world's first tilt-rotor aircraft, is in Nova Scotia for the next month to test its de-icing capabilities. As polar blasts hit the relatively warm air over the ocean, the weather creates ideal circumstances for what most pilots want to avoid.

"We had a hard time with the air traffic controllers when we first got here, because they thought we were kind of nuts looking for ice," said Don Byrne, project flight test manager .

Test pilots will fly the aircraft from CFB Shearwater, over the Bay of Fundy and the Northumberland Strait, using laser probes to find clouds filled with water droplets they hope will cover the V-22 in ice.

The Osprey uses inflatable bladders on its wings to break ice that forms in mid-air. It can also run an electric current through the wings and its twin rotors to warm them and melt ice.

Ice can weigh down an aircraft, "but actually the more insidious problem is ice disturbs lift," said Tom Macdonald, a test pilot for The Boeing Company, the U.S.

aviation giant that built the aircraft with Bell Helicopter Textron, Inc. Pilots hope to find stratas of clouds containing ice or water.

"We'll immerse ourself in a cloud, and if ice begins to build up that we can't control, we'll be able to descend out of the cloud into clear air and shed the ice," said Macdonald.

There are only nine V-22s in the world. They can take off and land like a helicopter, but then swivel the engine nacelles and rotors 90-degrees and fly at 465 kilometres per hour, like a regular plane. They can accelerate from hovering at a standstill to top speed in 12 seconds. "It's absolutely a blast to fly," said Macdonald.

Converting to airplane mode creates "unbelievable acceleration," said Byrne. "It tries to roll you out of your seat."

The U.S. Marine Corps has ordered 360 Ospreys to replace the H-46 Sea Knight, the American version of the Canadian military's Labrador. The Marines plan to use it as an assault transport aircraft, designed to carry 24 combat-equipped troops. The U.S. Air Force has ordered 50 of the aircraft.

In Canada, Canadair developed a tilt-wing aircraft in the 1960s that was evaluated -- but never adopted -- by the U.S. forces.

"We learned a lot from those programs," said Macdonald. "But modern composite materials, such as high-strength carbon fibre, have made such aircraft more practical.

Marine Corps: MV-22 production aircraft return to flight

HEADQUARTERS MARINE CORPS, Washington, D.C. (Reprinted with permission from a HQMC Public Affairs press release.) May 25, 2000 – The Commandant of the Marine Corps, Gen. James Jones, today authorized the return of Low Rate Initial Production (LRIP) MV-22 aircraft to flight operations.

The return of production MV-22s to flight status, with essential aircrew only, marks the beginning of the second phase of the return-to-flight plan established after the loss of 19 Marines in a crash at Marana Airport in Tucson, Ariz.,



V-22 EMD Flight Test Status as of May 26, 2000

A/C #	Total EMD Hours	Total EMD Flights
7	394	195
8	482	271
9	318	140
10	430	186
Totals	1,624	792

Total V-22 Flight Time	2,828 hrs
Maximum Airspeed Attained	342 kt
Maximum Altitude Attained	25,000 ft
Max Take-Off Gross Weight	60,500 lb
Maximum Load Factor	3.9 Gs

April 8.

Initial flights in the production aircraft will follow a methodical approach used to re-familiarize pilots with an aircraft after an extended period of non-flight status. A combination of simulator and familiarization flights will be completed in preparation for resumption of Operational Evaluation.

OPEVAL is designed to validate the aircraft's tactical application in support of Marine Corps missions and will continue to be flown by the Multi-service Operational Test Team pilots.

The MV-22 is a proven aircraft that has completed extensive flight testing of its technical design and performance, including more than 3600 hours of accumulated flight time. The Osprey that crashed was one of four production aircraft participating in OPEVAL.

The MV-22 has safely flown more than 40 troop-lift missions and has carried more than 700 troops during OPEVAL flights. Following continued analysis of flight operations, the third and final phase of the return-to-flight plan will begin with passengers on board.

To personally demonstrate their confidence in and commitment to the MV-22, Gen. Jones and Gen. Michael E. Ryan, Chief of Staff of the Air Force, plan to be aboard the first aircraft carrying passengers.

The Marine Corps continues a thorough investigation of the recent accident and is committed to finding and correcting the cause.

Osprey Facts is published by The Boeing Company in Philadelphia and Bell Helicopter Textron, Texas. Editor-in-chief is Norb Josten (E-mail, norb.josten@phl.boeing.com); production editor, Doug Kinneard (doug.kinneard@boeing.com). Information contained herein is compiled from unclassified and open sources and does not represent an official position of either of the companies. Comments or suggestions should be forwarded to Norb Josten, Boeing Philadelphia, M/S P23-00, PO Box 16858, Philadelphia, PA USA 19142-0858. Tel (610) 591-3366, Fax (610) 591-8251.