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All signs are that these plans will affect air warfare for decades to come. The AEA options were developed by a Navy-led analysis of alternatives team, which wrapped up its work in December. In a 10-volume classified study, the team examined how the services could replace the capability of the Navy’s EA-6B Prowler and other Electronic Warfare systems now nearing the end of their planned or useful service lives. The study included input from 125 government and contractor organizations and set benchmark prices for many of the options considered.

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- The inventory of EA-6Bs, used jointly by the Air Force, Navy, and Marine Corps—a low-density, high-demand asset—won’t meet minimum requirements in 2009 because of the aircraft’s age and expected attrition.
- Recent conflicts have demonstrated that a continuing, vigorous AEA capability will be needed for virtually any future air campaign.

Although Aldridge will review the service plans and send them back for further refinement—especially in the area of cost—he is expected to allow the Navy to pursue a replacement aircraft for the EA-6B, a move the Air Force also supports. In its turn, the Air Force will, for now, concentrate on a variety of programs—emitter pods, decoys, some classified programs—that will address the re-
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Defense-suppression aircraft, like this F-16CJ with HARMs, are just one facet of many in defeating enemy air defenses. This month, the Pentagon will chart a new course in the electronic attack arena.
The Air Force gave up its last EF-111 escort jammer (foreground) in 1998, agreeing to share the fleet of 126 EA-6Bs (background) with the Navy. Already stretched thin, the fleet drops below bare minimums in 2009.

sue for this decade. A longer-range plan could see the Air Force acquiring its own jammer airplane, although service officials have not been pushing such an option.

In Operation Allied Force, the Balkan air war of 1999, the limited supply of EA-6Bs as an escort jammer for certain missions “constrained” NATO’s ability to strike at the time of its choosing, particularly after many weeks of operations, said a study participant. Recent groundings of the Prowler for mechanical problems have heightened the Navy’s sense of urgency in seeking a replacement.

Pressing Issue

The AEA issue is a pressing one for all of the services. Afghanistan offered a “fairly benign” air defense environment, but the next US opponent may be far better equipped for air warfare, warned Lt. Gen. Charles F. Wald, Air Force deputy chief of staff for air and space operations.

“We’re OK,” for now, said Wald, speaking at a March air and space symposium in Washington, D.C. However, he added, the current adequacy of AEA capabilities may be short-lived.

“If we had to fight today” against an enemy equipped with typical air defenses, “I would be comfortable with what we have,” said Wald. “I think we’d do a great job. Two or three years from now—maybe five years from now—it’s going to change.”

Wald, who commanded US air forces in Afghanistan during the early days of Operation Enduring Freedom, cited several reasons for projecting this change of events.

First, advanced anti-aircraft defense systems such as the Russian S-300 and S-400 family are now on sale around the world and starting to complicate US air planning. The new systems mark a sharp improvement over the systems the US has faced in battle during the 1990s. They pose an unprecedented peril to unstealthy combat aircraft—which constitute the majority of US military aircraft.

The new opposition air defense systems “can reach out further,” said Maj. Gen. Daniel P. Leaf, the Air Force’s director of operational requirements. New systems can both detect aircraft at much longer ranges than before and have longer-legged missiles that can reach the targets farther away. Older systems have also benefitted from integration of previously unrelated components, said Leaf, in a process that is sometimes called “hybridization of air defense weaponry.”

Hybridization

In the 1999 Balkan War, Leaf explained, Serb forces used radars not previously associated with anti-aircraft systems. He added that they also inventively linked “visual reports, cell phones, [and] ham radios to cue the air defense net in a simple but relatively effective network.”

Though the Serbs succeeded in downing just two NATO aircraft during the course of the conflict, they fired about 700 missiles, forcing NATO to use jamming and defense suppression aircraft until the very end of the operation.

Second, the emerging hybridization of air defenses means that Western air forces cannot be sure of winning the electronic battle simply by application of “radiated power at the face of the enemy radar aperture”—Leaf’s words. The brute-force blinding of enemy radars with high-energy emitters will be difficult.

“It’s much more refined than that,” Leaf said. Weapons, deception, information warfare, and decoys “are all going to have to continue to improve.”

Third, the growing mobility of adversary air defenses is changing the whole structure of the AEA mission. Leaf said that old-style fixed strategic systems and transportable systems that could be moved, set up, employed, and then moved again are giving way to much more nimble and elusive systems that can virtually shoot on the move.

“Everything is migrating to being much more mobile,” he observed, “and that makes sense, because if they’re not mobile, we’ll find them and kill them.”

Leaf was one of the senior Air Force members of the team that produced the analysis of alternatives. He cautioned that the options developed were intended to “provide a capability at least as comprehensive as that which will be offered by the EA-6B with the Improved Capabilities [or] ... ICAP III” system upgrade.

“That’s a pretty specific focus,” said Leaf. “It will not answer all our needs for countering air defenses or even for Electronic Warfare, probably, especially as threats continue to mature.”

According to an unclassified summary of the analysis of alternatives, the participants concluded that an effective AEA solution must have two parts: a “core” system of reusable aircraft operating in enemy airspace and an “expendable” system that will work close to enemy sensors and air defense systems—too close for the core platform to survive.

The summary stated that no emerging technology or mix of technologies will eliminate the need for a
comprehensive AEA capability in US air superiority forces, even accounting for the advance of stealth technology, the availability of increasingly powerful self-protection systems, and the advent of small, electronically scanned array radars now being fitted on fighter aircraft. The analysis looked at combinations of platform options which ranged from new-start aircraft to business jets, variants of existing and planned fighters and bombers, “wide-bodies” such as Electronic Warfare versions of the 737 and 757, and unmanned aerial vehicles, both armed and unarmed. Various combinations of land- and sea-based capabilities were considered.

**Smorgasbord**

The analysis amounted to what one industry participant called a “Consumer Reports list” of available products that could do the job, at various levels of effectiveness, and at various prices. The cheapest option was pegged at about $20 billion. It would be based on a “new-start, high-flier” program patterned on the Global Hawk high-altitude unmanned aerial vehicle, used in conjunction with a smaller system, such as a loitering drone or missile, that could directly attack enemy radars and sensors.

At the other end of the spectrum, the most expensive and comprehensive option—at about $82 billion—included electronic attack variants of the Navy F/A-18E/F fighter, Air Force F-22 fighter, and USAF B-52 heavy bomber, along with a close-in attack system.

The study expressed cost in “total ownership” terms, which includes military construction, training, maintenance, and the like. In the case of the three most expensive options, prices were quoted by system program offices as well as the Pentagon’s cost assessment improvement group, which the Pentagon maintains to provide independent appraisals. Costs were for comparative purposes only and not to be considered predictive.

For purposes of the analysis, options did not have to meet budgetary limits. In the choices that go to Aldridge this month, however, the services will have to show how they will plan to pay for their preferred approaches.

Leaf said a new body—the countering air defenses joint requirements working group—was formed to eliminate redundant capabilities among the services, look for complementary capabilities, and determine whether the services should pursue entirely new systems.

The Air Force has been roundly criticized for its decisions to retire the F-4G Wild Weasel dedicated Suppression of Enemy Air Defenses aircraft and the EF-111 escort jammer in 1995 and 1998 respectively. Critics say the Air Force was overly enamored with stealth and paid insufficient attention to Electronic Warfare.

USAF substituted the F-16CJ with the HARM targeting system for the F-4G and agreed to share the EA-6B with the Navy when the EF-111 was phased out.

Leaf said neither retirement decision was taken lightly. “We were making some very tough decisions,” he insisted. “We didn’t get rid of those aircraft because we wanted less capability. There were very serious downsizing constraints as the force grew smaller.”

The decision to rely on the Navy’s Prowler fleet was “a tough choice,” he added.

The Air Force’s near-term options...
mostly revolve around systems that can be appended to existing airframes. These included towed decoys, targeting pods, new munitions, information warfare systems, directed energy weapons, and the Miniature Air-Launched Decoy, or MALD.

“Where we’re headed is to balance fiscal reality with the requirements and opportunities,” Leaf said. The Air Force would like to avoid a repeat of the Balkans situation by ensuring that enemy surface-to-air missile sites are not just suppressed but actually destroyed.

**“Shoot and Scoot” Systems**

“We must do a better job of killing surface-to-air systems,” Leaf said. “We can’t give [the enemy] the capability to ‘shoot and scoot’ and hide throughout [the conflict].”

The Air Force is already emphasizing quick location and destruction of mobile and time-critical targets, Leaf said, and its programs will all bend in that direction.

A senior Air Force official said the service is satisfied with the Navy as a partner on the EA-6B and added that USAF has had access to the jammer aircraft whenever it wanted such access. “All these assets are on the ATO [Air Tasking Order],” the official said. “The decision as to who gets what and when is made at the level of the JFACC [Joint Force Air Component Commander].”

“We don’t run solo operations much, so we get that support when it is appropriate for us to have it,” he observed.

The EA-6B is a 1960s–technology airplane. Though it has profited from an ongoing, state-of-the-art avionics upgrade, it is still an aging aircraft, frequently beset by mechanical problems. The Navy would like to move to a new airplane, easier to fix and with greater capability.

Ever since the Navy opted to pursue the F/A-18E/F Super Hornet, it has had a policy of shrinking, whenever possible, the number of aircraft types on its carrier decks. It does this to reduce the number of parts inventories and repair capabilities that it must maintain. The Super Hornet and its smaller predecessors, the F/A-18A-D models, have a high commonality of parts, and the sea service would like its EA-6B follow-on to be a Super Hornet variant as well.

Boeing has developed the “EA-18” proposal to meet the requirement and said it has been working on the project since 1993.

“We call it the ‘Growler,’ ” said Paul Summers, Boeing’s director for F/A-18 derivative programs. “This concept is extremely mature.”

Summers asserted that Boeing has thoroughly worked out the internal design of the EA-18 and has endeavored to make it compatible with the EA-6B’s ICAP III jammer pods with only minor modifications. Flight tests to check the fit of the external systems have already been flown. Including internal processors, the EA-18 would have 70 percent commonality with the EA-6B’s Electronic Warfare systems, Summers said.

**Just In Time**

Because the F/A-18E/F test program is far along—and the EA-18 is externally almost identical to the F model—Boeing believes it could have the first nine EA-18s available for duty in 2009. That is exactly when the Navy will begin to run short on EA-6Bs and would assume a go-ahead in 2004.

“This is an integration program,” Summers insisted, and the Navy can save a great deal of money because it doesn’t need to certify the type or repeat flight testing. So common are the aircraft that the Navy has also asked for quotes on making all F model Super Hornets capable of using the interchangeable Electronic Warfare pods and internal systems, to ease deckling considerations and broaden the interchangeability of its fleet. The EA-18 would retain all the combat and tanking capability and weapon stations that the F model has, without the internal gun. The additional onboard gear to make the F model an EA-18 is about 350 pounds, a figure that would be reduced to 200 pounds if fiber optics supplant coaxial cable in the aircraft.

While the Navy currently fields a fleet of 122 EA-6Bs, the Air Force and Navy agree that number is too low and that it would be desirable to fix the low-density, high-demand problem.

“Pricing for 180 airplanes has been requested by the Navy,” Summers acknowledged. “That number assumes they will continue to support Air Force requirements. If they don’t have to, the number will be lower.”

Summers said that Prowler crews have looked over the layout of the two-man EA-18 and believe it can, with automation improvements, do the job that the four-seat Prowler now does.

Besides commonality and manufacturing and development savings, the EA-18 offers the Navy and Air Force an opportunity to recover the escort jammer role that was surrendered when the EF-111 left the inventory.

“This is an airplane that can go supersonic ... and keep up with the
strike package, if that’s something you want to do,” Summers pointed out. Because it retains combat capability even with some jamming pods carried, it could do some of the SEAD mission as well, he added.

According to the AEA analysis of alternatives, an Electronic Warfare plan focused on the EA-18, adding new-technology jammer pods, would cost about $40 billion over the life of the program. Another option—restarting the EA-6 line and building brand-new EA-6C aircraft with new-technology pods—would cost about $34 billion.

One of the most attractive options, said one participant, was an AEA version of the Joint Strike Fighter. Both a carrier capable and conventional takeoff version could be developed and fielded for about $38 billion, but “there would be a long wait before we could get those airplanes ... unless we did them simultaneously with the [conventional] attack version,” he said. The F-35 JSFs don’t begin to roll off the assembly line until 2008, and the first units will not be equipped until 2010.

The Stealth Factor

The Air Force’s unique requirements for AEA are still being worked out, Leaf said.

“We’ve got to ask ourselves, will we have the right Electronic Warfare capability to support a fleet that’s going to become increasingly stealthy, ... some element of which will operate at supersonic?”

With the F-22 entering the battle zone at Mach 1.5 or more, “we’ve got to make sure we have responsive, flexible EW support to match that kind of capability. Some of that ... may be inherent to the F-22 itself. An EF-22 is among the options the Air Force is considering.”

Wald said that replacing the EA-6B is “probably necessary. ... We support the Navy’s initiative to replace some of their EA-6s.”

However, “there are additional capabilities we’re going to have a look at,” Wald added. Some of these are nontraditional, such as the Air Force’s SEAD unmanned combat aerial vehicle.

The “replacement in capability, if not in kind, of the EA-6B is probably not going to meet our needs in the next decade,” Leaf acknowledged. “We’re probably going to have to go beyond [it] ... and that may require a new platform.”

The Air Force is “committed to Electronic Warfare,” Wald asserted. “We’re not committed to a single platform. We’re committed to multiple platforms, ... to a synergistic approach, maybe some nonconventional ways of doing some of this that haven’t been talked about before.” These will include “traditional methods as well as information operations, space capabilities, ... and perhaps some emerging technologies that are still classified.”

In an apparent nod to criticisms that the Air Force has not taken the EW mission seriously enough, Wald said, “It’s not a simple problem. It goes to this debate over suppression of enemy air defense and destruction of enemy air defense. As if it was either–or. There is no either–or.”

The Pentagon’s plan of addressing AEA with add-on systems first, followed by a new platform at the 10-year point, and more sophisticated new technologies after that, “will meet the threat of the future,” Wald said, “as long as we stick with it.”

An electronic attack version of the JSF might make sense as the next jammer platform, but it doesn’t arrive until 2010, leaving a gap in coverage. One JSF option (top) is for a “clean” version with EW gear carried internally. Another idea (here) would use external pods already in the works for the EA-6B.