

New dog in the fight

EA-18G Growler, Navy's newest electronic attack aircraft, completes first flight



The first EA-18G Growler, designated EA-1, is shown on the Boeing ramp after the rollout ceremony on Aug. 3. The Growler will be flown in St. Louis several times before heading to its new U.S. Navy home at Naval Air Station Patuxent River, Md.

By KATHLEEN COOK

When the U.S. Navy first asked McDonnell Douglas in 1993 to determine the viability of using an F/A-18F airframe to replace the service's current airborne electronic attack aircraft, the EA-6B, no one could be sure the concept would work. Six months later, a handful of employees not only believed it would work, they convinced corporate leadership to invest company funds to prove they were right.

On Aug. 15, that small investment returned big benefits to the Navy and to Boeing, as the Navy's newest weapon, the EA-18G Growler, took its first flight from Lambert Airport in St. Louis. The EA-18G enables warfighters to perform an array of airborne electronic attack missions, operating from either the deck of an aircraft

carrier or land-based fields. Through these capabilities, warfighters can jam, or suppress, enemy radar and communications to protect friendly assets in the air and on the ground.

"When we started, we thought it was an intriguing idea," said Paul Summers, director, Global Strike Systems Integration and "father" of the EA-18G program. "But within six months, we knew it would work. We just needed a chance to prove it. And we did."

"Growler is a model of what a strong, strategic relationship between the Navy and industry can do," said Adm. Michael Mullen, chief of Naval Operations for the U.S. Navy. "By working together, we can and must produce capabilities that will keep our nation secure while keeping faith with the American taxpayer."

Going from an intriguing idea to a real airplane wasn't easy, but Boeing did it—ahead of schedule and within budget. In the world of

Growler fast facts

Number of Growlers planned: 90
Number of carrier-based Growler squadrons: 10 squadrons, five aircraft per squadron
Weight (empty): 33,094 pounds (15,011 kilograms)
Max take-off weight: 66,000 pounds (29,937 kilograms)
Max landing weight: 48,000 pounds (21,772 kilograms)
Length of System Development and Demonstration contract: Six years
Cost of System Development and Demonstration contract: \$1 billion
Maximum speed: Mach 1.6+
Maximum number of jamming pods: 5
Total engine thrust: 44,000 pounds
Number of antennas: 44 assemblies (multiple antennas per assembly) [Super Hornet has 24]
Length of wingtip pod: 10 feet (3 meters)
Weight of wingtip pod: 300 pounds (136 kilograms)
Number of possible configurations for transmitters, radomes and antennas: More than 6
Fuel capacity: 13,940 pounds (6,323 kilograms) of jet fuel
Crew: Two
Number of suppliers: 1,800
Year of Initial Operating Capability: 2009



RON BOOKOUT PHOTO

major development programs, that is rare. Summers said he considered that the team's greatest accomplishment: "We made a promise, and we delivered on that promise. You can't do better than that."

Delivering on that promise has been the cornerstone of the EA-18G program and a legacy inherited from the F/A-18 program, of which it is a part. That ability to deliver goes directly back to the people who work the program, according to Mike Gibbons, the current EA-18G program manager, who joined the team before the contract award.

"The fact that other programs within the aerospace industry have been late or more expensive than original projections is a concept that we, from day one, never bought into. It was simply not acceptable," Gibbons said. "We've taken it as a matter of pride that we're going to execute this program on or ahead of plan and within budget, and we're doing so."

Jamming 101: A primer on the EA-18G's capabilities

What's the difference between the EA-18G and the F/A-18F Super Hornet?

The EA-18G looks a lot like an F/A-18F, until you notice the pods under its wings and on its wingtips. Those pods, along with new electronic systems and software inside the aircraft, set the Growler apart from other jets and define its primary role in the battlespace—to jam, or suppress, enemy radar and communications in order to protect friendly assets in the air and on the ground.

The Growler can protect multiple aircraft or ground troops on a single mission. Getting that job done involves three steps.

- The Growler locates and analyzes potential radar and communications threats.

To locate and identify the radar and communications threats, the Growler combines data from mission planning with information from onboard sensors and communications devices. Mission planning is a pre-mission operation where the aircrew is briefed on known threats such as locations and types of radars and surface-to-air missile sites, and with the rest of the strike group, plans the mission to address or avoid the threats. The Growler also incorporates a satellite communication device for intelligence gathering.

Unlike the EA-6B Prowler, which currently performs the electronic attack mission, the Growler will enable its aircrew to communicate while jamming.

- The aircrew determines if and how the threats need to be engaged.

The Growler aircrew views gathered information on a color display. The location of potential threats and other critical data can be overlaid on a topographical map or shown in tabular formats with other vital information. Software algorithms that correlate and filter the information help the aircrew analyze the data and make time-critical decisions.

- The Growler neutralizes these threats, clearing the way for the aircraft or ground troops to do their mission.

The Growler neutralizes threats primarily by using the electronic attack jamming pods to "confuse" enemy radars. The jamming pods transmit specific frequencies of electromagnetic interference to blind enemy radars so they cannot see a group of incoming strikers.

Sometimes, the mission or threat requires the enemy site be knocked out with missiles. Since the Growler can carry high-speed anti-radiation missiles in combination with the jamming pods, aircrews have that option at their disposal. The missiles use the enemy radar's own signature to track and destroy the threat.

The Growler's job isn't confined to jamming radars, however. Using its communications countermeasures, the Growler can suppress enemy communications so ground sites cannot communicate with each other. By disrupting the network, it isolates potential threats.

Ultimately, the Growler's primary role is to help the aircraft it flies with or the ground troops it protects perform their missions, and to increase the survivability of the entire sortie. By jamming radars and interrupting communications, it can do exactly that. And because it's a derivative of the Super Hornet, it can fly with other supersonic jets to get the job done quickly and effectively.

—Kathleen Cook



RICHARD RAU PHOTO

Top: Some of the more than 750 people who attended the Growler rollout take a first close look at the new aircraft.

Bottom: From left, Boeing executives Jim Albaugh and Chris Chadwick, Adm. Mike Mullen, Vice Adm. Jim Zortman and U.S. Rep. Todd Akin (R-Mo.) take a few minutes at the end of the rollout ceremony to view the EA-18G.



RON BOOKOUT PHOTO

high-power jamming pods without interfering with the fly-by-wire flight controls, the displays in the cockpit and the other electronics in the F/A-18. Once again, the Boeing team took a proactive approach to answer the Navy's concerns.

"The Navy and Boeing took an F/A-18 to Naval Air Station Patuxent River, Md., put it in an electromagnetic testing chamber, hung jamming pods on it, radiated it, and proved that the airplane was 'hardened' enough to do this mission," Summers said.

The third major concern was whether the ALQ-99 jamming pods, which were designed for the subsonic EA-6B, could survive in the turbulent undercarriage environment of the Super Hornet wing. To alleviate concerns in this area, Boeing put the jamming pods on its flight-test demonstrator aircraft, F/A-18-F1, and flew the aircraft from Boeing facilities in St. Louis.

"On our first flight, we took the aircraft to 0.9 Mach at 30,000 feet, which was a milestone in itself," Summers said.

SYSTEMS INTEGRATION—AND MORE

Successfully demonstrating the concept would work was key to winning the System Development and Demonstration contract in 2003, Summers explained, but there was a lot of work still to be done. The EA-18G program is largely a systems integration challenge, Gibbons said, bringing together several existing programs and technologies to create a new weapon in the Navy's arsenal.

Part of that integration and one of the biggest technological challenges for the program was the ALQ-218 antenna pods, which will be permanently mounted on the wingtips of the EA-18G. On the EA-6B, the antenna pods are mounted on the tail.

The EA-18G team took the hardware for ICAP-III—the Improved Capability III electronics system for airborne electronic attack, of which the ALQ-218 pods are a part—and repackaged it to

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MEETING CHALLENGES

That isn't to say there weren't some big challenges along the way, Summers said. During the development of the concept, Summers recalled the Navy identified several critical risks to any follow-on to the EA-6B, the Navy's current airborne electronic attack platform. Among them: Can a crew of two in an EA-18G perform what a crew of four is currently doing in the EA-6B?

Betty Neill, the EA-18G crew vehicle manager, said Boeing answered that question by hosting more than 500 Navy crew members through EA-18G simulators over a span of 10 years to test, define and refine the concept. "We changed a lot of minds during that process," Neill said. "It was a grassroots effort, really, to bring people in to take a look at what we had, sit in the seat, manipulate the controls and displays, and convince themselves through experience that they would be able to achieve the mission with two aircrew."

Boeing took this idea one step further, developing a simulator it then put inside a tractor trailer and took to various sites around the country. The EA-18G trailer allowed Boeing to reach scores of Navy operators and decision makers who could see for themselves the concept was viable.

Another major question was whether a fighter jet could carry the

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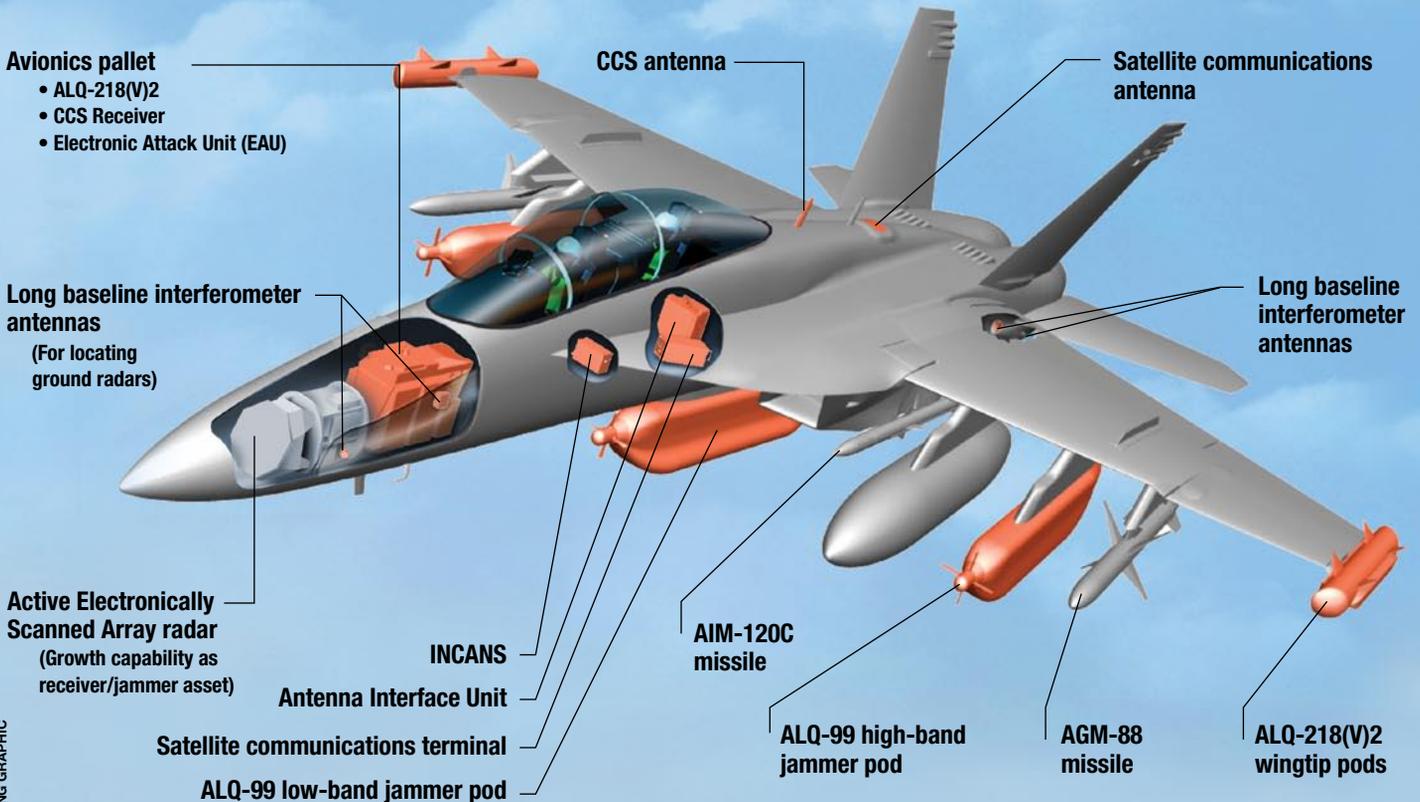
One proud father

Paul Summers (left), director of Precision Engagement and Mobility Systems integration for Boeing, probably knows more about the beginnings of the EA-18G than anyone else. He was there when the concept was first proposed and was the leader of a group of six employees who first studied the concept.

Summers explained to *Boeing Frontiers* why this aircraft is significant to Boeing and the U.S. Navy.

EA-18G: INTEGRATING THE LATEST ELECTRONIC ATTACK TECHNOLOGY

COVER STORY



BOEING GRAPHIC

ALQ-218(V)2 RF Receiver System

- Wideband receiver providing accurate emitter identification and location
- Selective reactive jamming capability

Interference CANCELLATION System (INCANS)

- Providing UHF communications capability during ALQ-99 jamming
- Significant communication and situational awareness improvement

ALQ-99 Tactical Jamming Pods

- Proven system already in U.S. Navy inventory
- Ongoing transmitter upgrade program

Communication Countermeasures Set (CCS)

- Smaller and more capable than USQ-113 with expandable infrastructure
- Transmit function through low-band ALQ-99 jammer pod

Q: How important is the EA-18G Growler?

A: The Growler will be very important to the Navy. The current electronic jamming platforms, the EA-6B Prowlers, are aging rapidly; they need to be replaced, and the G is the perfect choice for a next-generation jamming platform for the Navy. It's part [F/A-18] E and F (model) and it's part G. The vehicle infrastructure will be consistent across all three platforms, which makes this the most economical solution for our customer.

Q: How would you characterize your contribution to the EA-18G?

A: I was once called the "grandfather" of the G. I much prefer to be remembered as the "father" of the G program. It's a great moniker, but no one person can be solely responsible for such a broad-based activity. It takes a dedicated team to make it happen. And we have such a team.

Q: What event will you remember most about your work on the EA-18G?

A: Two events stick out most: The first flight of our F/A-18F1 demonstrator aircraft carrying the ALQ-99 jamming pods. We were standing very close to the runway as the aircraft took off; it was a great vision into the future. The second was when I received a call from the Navy authorizing the start of

the SDD [System Development and Demonstration] program.

Q: What is most important to meeting cost and schedule commitments?

A: We did all the homework up front and spent the time required to make sure we were doing it right. We created a schedule to accommodate the possibility of unexpected events, so if things did happen, we could compensate and still make our critical dates.

Q: What would you tell the customer about this aircraft?

A: I'd tell them they should be proud of this platform because it's going to perform a critical mission for our warfighters. Once this aircraft gets in the fleet they're going to realize it's so flexible, with the electronic attack [jamming] capability, with the sensing capabilities, with the AESA [Active Electronically Scanned Array] radar, with the two-person crew. They're going to realize they can do many more things with this aircraft to expand the scope of its mission. It's going to end up being much more than just a traditional electronic attack platform.

—Kathleen Cook



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meet the unique requirements of the EA-18G, said Kevin Fogarty, the EA-18G chief engineer.

But the EA-18G is not just about integration, Fogarty noted. The EA-18G program was able to enhance some capabilities and to add capabilities not available on the EA-6B. Perhaps the most significant is the Interference Cancellation System. This system will allow EA-18G aircrews to communicate with friendly forces while jamming, something not available today.

To make the aircraft concept real, assembly workers had to take the technology and the various systems and build an airplane—two, actually.

In July 2004, various industry partners began working on their parts of the first aircraft. That October, Boeing workers loaded the first part into a tooling jig at the St. Louis plant to assemble EA-1 and after that, EA-2, the two flight-test aircraft constructed under the System Development and Demonstration program.

While production EA-18Gs will be built on the same production line as F/A-18E/F aircraft, the first two EA-18Gs were partially constructed following established F/A-18 procedures. In May 2005, they were moved to the experimental shop in St. Louis, where a team of specialists from Boeing and its industry partners have worked to modify the jets. The team has strung more than 2,500 feet (762 meters) of radio-frequency (shielded) cables, installed new avionics boxes, tested the systems, installed engines and in a thousand ways created the Navy's newest aircraft.

Virtually every leader on the team said what has made the program so successful has been the teamwork. But what really sets the EA-18G program apart, according to Bob Feldmann, Boeing vice president for the F/A-18 programs, is "executing to plan. The people on the team are having fun doing it, and we're going to give the Navy a product they're going to be very proud to own. That's the definition of success." ■

kathleen.m.cook@boeing.com



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Top: Boeing F/A-18 chief test pilot Ricardo Traven commemorates the first flight of the EA-18G with a special Growler silhouette decal on his helmet visor shield.

Above: Boeing flight ramp personnel wait to greet pilot Ricardo Traven (on stairs) and weapon systems officer Rick Junkin as they deplane after a successful first flight.

St. Louis' take on the EA-18G

Boeing *Frontiers* asked EA-18G team members in St. Louis what the development and first flight of the Growler meant to them.

Jim Watt Electrician

"I told one of the guys, 'you're not building an airplane; you're making history here.' This is going to do things that have never been done before. Talk about Star Wars, this is pushing the edge."

"It always gives a guy chills when you see something you built, or see something fly, or you see it on television, and you say to your grandkids or children, 'I was part of that; I was in that.' It just makes you feel real good."

Roger Zepeda Electronics electrician

"If I could talk to the people who will fly this plane, I'd tell them that they can have 100 percent confidence in the aircraft. Just knowing that it's been worked by guys like this (team), it's a quality product. They can have every assurance that it will do the job they need it to do."

Jerry Henry Technical lead for flight-test instrumentation

"It's important to the Navy that they know we can do this. We can meet cost and schedule and still come in under weight. For an airplane, the most important thing is to be under weight and perform the way it's supposed to perform. So the fact that we did it and we proved we can do it, that's the most impressive thing."

Roxanne Baker Instrumentation operations engineer

"This is the first project like this I've been on. It was really cool to be here, to be close to the airplane, to walk on the wing. It's why I took this job: to touch the airplane and to get to be around it. I love the hardware side of things."

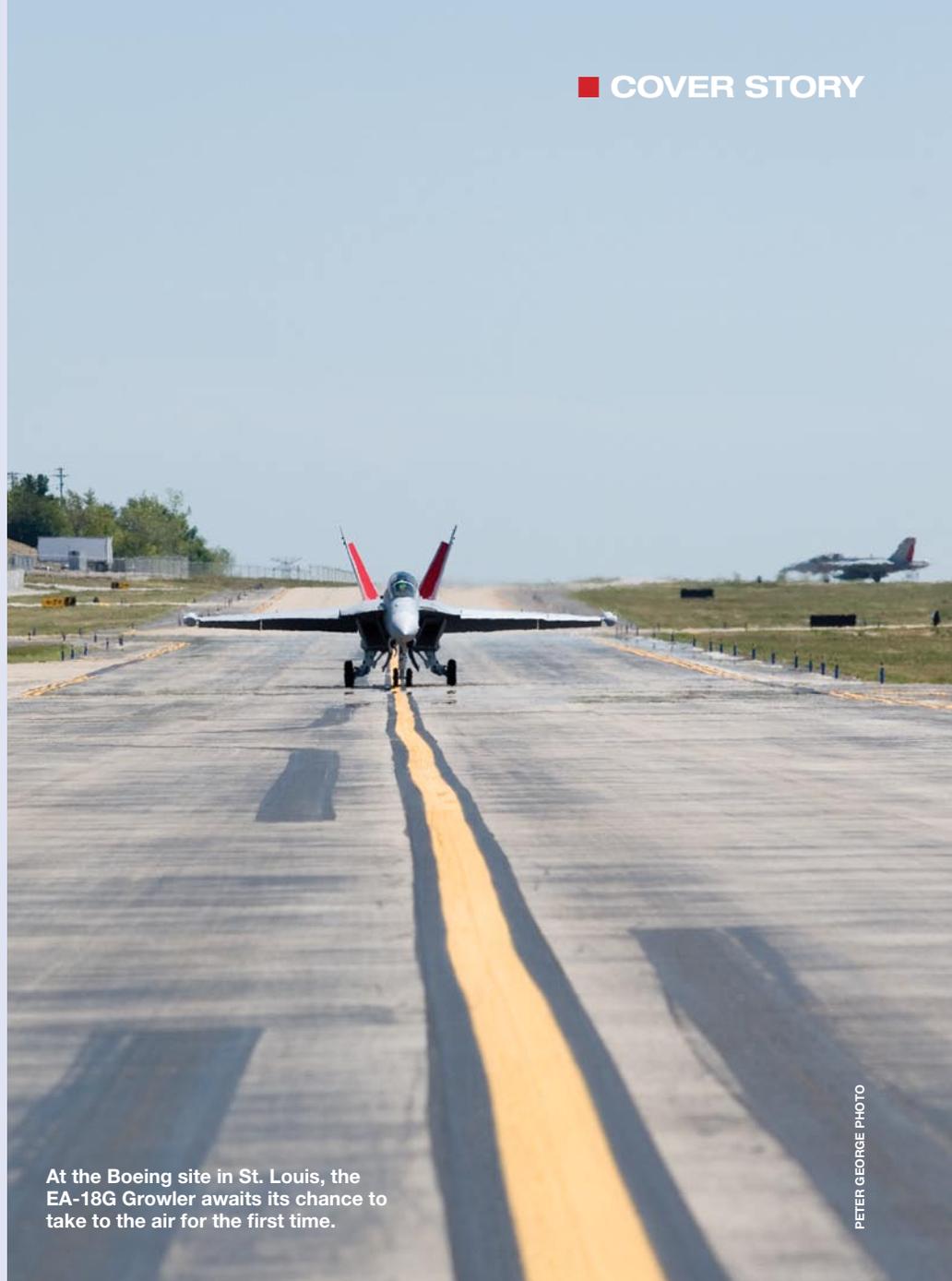
Kevin Joost Sheet Metal And Riveter

"We've put a lot of effort into these airplanes, a lot of hours, and I'm just going to be very proud to see this fly."

Aaron Graber Electrician

"Teamwork is very, very important on this project, from a lot of different angles—from engineering to mechanics, to electricians, to everything combined—to make the final product. It's very team-intensive. The level of dedication has been impressive."

"Watching this aircraft roll out will give me a great sense of accomplishment. It's been labor-intensive, and challenging at times, but the team has taken it step by step, accomplished a series of goals to get to the ultimate goal of rolling out the jet."



At the Boeing site in St. Louis, the EA-18G Growler awaits its chance to take to the air for the first time.

PETER GEORGE PHOTO

L. J. Moore Flight test engineer

"The most important thing I will take away from this experience is all the lessons I've learned on the shop floor. It's trial by fire down here. I've become a lot more confident and a lot more assertive in getting the job done, and taken the initiative to do things, versus sitting at a desk. When you're there, right next to the airplane and you see the final product, everything hits home a lot more. Seeing an aircrew walk down the hallway makes what you're doing seem a lot more important."

Robert Price Sheet Metal And Riveter

"This is a state-of-the-art product. Some of the aircrew have come out and looked at the product, and they're as thrilled as we are. I'm glad for them, and I'm glad to see this go from an idea on paper to what it is today."