

# Building on success

Boeing's commercial jetliners make an ideal platform for a variety of military derivative aircraft

By Eric Fetters-Walp

As Boeing commercial jetliners crisscross the globe every day, military and government aircraft based on those planes are transporting state leaders, patrolling the skies and assisting warfighters.

For more than a half-century, Boeing and its heritage companies have designed and built more than 1,000 specialized aircraft based on commercial airplanes. With growing international demand for military derivatives, and the recent success of the P-8A Poseidon, these programs are garnering significant attention.

"We have a historic window, both domestically and internationally, where you have tired iron [aging military airframes] and the need for new capabilities, and Boeing's poised to provide the new generation of replacements," said Chris Chadwick, president of Boeing Military Aircraft, part of Boeing Defense, Space & Security.

For the P-8, a derivative of the popular 737 commercial jet, Boeing expects to build 117 planes for the U.S. Navy and is already on contract for eight from India, Australia, Turkey and the Republic of Korea have purchased a total of 14 new 737-based Airborne Early Warning & Control (AEW&C) models. And Boeing Military

Aircraft sees huge potential in modifying the Next-Generation 737 platform for a host of other military missions. Boeing also is competing to have its 767-based NewGen Tanker replace hundreds of aging KC-135 tankers operated by the U.S. Air Force.

Meanwhile, the U.S. president and congressional leaders fly on specially outfitted 747s, 757s and 737s.

Modifying commercial aircraft for military and government uses is not novel. Boeing heritage company Douglas Aircraft produced the first airplane used regularly by a president in 1944, when Franklin D. Roosevelt began flying on a modified DC-4. The first modified 707 jetliner used as *Air Force One* began service in 1962.

"We started with the president's airplane 50 years ago, and we've added to that portfolio ever since," said Steve Wade, general manager of Global Transport & Executive Systems, based in Wichita, Kan., where he also is the site executive. That site modifies and supports Boeing Business Jets, 707s, 737s, 757s and 747s used by state and military leaders around the world.

"Our platforms are the most capable, and they're the most flexible in the world," said Fred Smith, director of P-8 Business

Development. "We must continue to show compelling value to our customers." The development of the new 737-based P-8A for the U.S. Navy offers an ideal model for how that can be accomplished, he added.

The Poseidon team is using an in-line production process—the industry's first for derivative aircraft—based on the Boeing Next-Generation 737 production system to build P-8 aircraft. "It is the most affordable and efficient way to build military derivative airplanes, and no one else in the world has this capability," Smith said. "By incorporating the best of BDS and Commercial Airplanes, we are able to produce a unique product line that is well-suited to replace any large military aircraft in the world today, no matter the mission set."

Traditionally, a commercial airplane destined for military use

**PHOTO:** The first P-8A Poseidon flight-test aircraft passes Seattle's Mount Rainier on its way to the Naval Air Station at Patuxent River, Md., last April. The P-8 is a derivative of the Boeing 737 commercial jet. JEREMIAH SCOTT/BOEING





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is fully assembled, delivered to a separate facility and then extensively modified. With the Poseidon, Boeing showed it could incorporate modifications from the start of production. The P-8 Next-Generation 737 fuselage is shipped by rail from Wichita, Kan., to Renton, Wash., with the weapons bay and other body modifications already in place. The submarine-hunting airplane then is put together on 737 Production line No. 3 in Renton’s Commercial Airplanes facility.

“The P-8 is not the same as a commercial 737 by any stretch, but it’s produced in the same production system,” Smith explained. “So when it gets to Renton, they never cut another hole in it.”

Bob Feldmann, vice president and general manager of Surveillance and Engagement, said the importance of that process change can’t be overemphasized. “At the start of the P-8A program, the in-line process was just a theory,” Feldmann said. “Boeing had to prove that we could conquer the challenge of integrating our design teams on a complex program.”

Tools and processes between Commercial Airplanes and BDS had to be harmonized for the P-8 program. “When the team saw

the success on the first P-8, it brought forward an avalanche of ideas on how to do it even better,” Feldmann said.

The integrated process has cut P-8 production cost and provided a model for how Commercial Airplanes and BDS can work together on military derivatives. Smith calls it a “180-degree change” from the previous way Boeing’s two biggest business units worked together on such programs.

John Pricco, Commercial Airplanes vice president for the P-8 program, noted the joint team must still address challenges, but the process clearly has been beneficial for Boeing. Not only does it advance BDS’ military aircraft programs, but using the 737 as a platform helps Commercial Airplanes’ business as well, he said.

“This opens up a new market for us that we might otherwise not get,” Pricco said. “We can do things for our customers that no one else can.”

Pat Shanahan, Airplane Programs vice president and general manager for Commercial Airplanes, sees lasting value in having more people from both sides of the company work together on derivatives programs.

“In the past, teams were often focused on the differences between commercial and defense,” Shanahan said. “Now, the words are different, the language and tone much more collaborative, with a focus on ‘how can we take advantage of our similarities?’ The teamwork is very visible and tangible, and I believe we are well-postured to take commercial-military development to the next level.”

Such cooperation is advancing the biggest military derivative program being pursued by Boeing: the \$35 billion competition to replace aging aerial refueling tankers for the U.S. Air Force. A

**PHOTOS: (Above)** The P-8A Poseidon is assembled in Boeing’s Renton, Wash., factory using an in-line production process based on Boeing’s Next-Generation 737 production system. Commercial 737s are assembled in a separate part of the factory.

JIM ANDERSON/BOEING

**(Insets)** Members of the P-8A Poseidon team at the Renton factory include, from left: Thad Atkins; Alfred Wheeler (left) and Loi Le; Ben Cervantes; Donna Bromley; Chantz Relerford; and Frederick Marshall. BOB FERGUSON/BOEING



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cross-enterprise team is leading Boeing's bid to provide the Air Force with the NewGen Tanker, based on the 767 commercial jet.

The “One Boeing” approach also has extended to smaller derivative programs. While the P-8 program is set to build at least 125 aircraft during this decade, Global Transport & Executive Systems sells just a few airplanes per year, sometimes with radical modifications.

“Modifications can take three months to two years. It all depends on how much militarization they want to do,” explained Wade, Boeing's general manager of Global Transport & Executive Systems in Wichita. “Sometimes we take it all the way down to the hull and build it back up. These modifications often can drive up costs, so finding a new way to deliver results to the customer was imperative.”

While the international market for executive-style derivatives is growing, Wade's organization has its eye on another major contest. It's gearing up to chase the Presidential Airlift Recapitalization—the upcoming bid process to replace the *Air Force One* fleet, possibly with new 747-8s.

“We've got a capture team lead, and we're working really hard for a successful bid,” Wade said.

Meanwhile, with the significant investment already made, the P-8's unique design and production process could be used for other future derivatives, Feldmann said.

Possible variants on the P-8 model include the Enhanced Capability Configuration as a replacement for highly specialized electronic surveillance and intelligence collection aircraft such as the U.S. Navy's EP-3; the P-8 Airborne Ground Surveillance, which could replace the Northrop Grumman E-8C; the P-8 Rivet Joint, to replace the RC-135 Rivet Joint fleet; and a P-8 AEW&C that expands the current 737-based programs in Australia, Turkey and Korea with new multi-mission capabilities.

Other specialized surveillance and intelligence variants are being explored, Smith added.

Boeing's focus is to continue to build on the versatile 737 platform, develop new derivatives of other models, possibly including the 787, and to make sure the company can offer reliability, value and capabilities that exceed competitors', according to Chadwick.

“We have a good strategy of creating differentiating value that no one else can easily match,” Chadwick said. “We can provide the right aircraft for the right mission at the right price.” ■

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**PHOTO:** Australia's Wedgetail program uses Boeing's 737 platform for its Airborne Early Warning & Control aircraft. CHAD SLATTERY



# Military derivatives, front and center

Boeing and its heritage companies have produced many different derivative aircraft. Listed and pictured here are a few major ones.

## BOEING:

**Model 367-80** – Known as the “Dash 80,” this was the basis for the KC-135 Stratotanker. Boeing built more than 700 KC-135s.

**707** – Boeing’s first production jetliner was the platform for the E-3 Airborne Warning and Control System (AWACS), of which 67 were built, and the first jet-powered *Air Force One*. The E-6A and -B Mercury airborne command post, produced for the U.S. Navy, also is based on the 707.

**737 and Next-Generation 737** – This popular commercial jet is the platform for the P-8A Poseidon; Airborne Early Warning & Control aircraft for Australia, Turkey and Korea; the C-40A U.S. Navy transport; the C-40B combatant commander transport; and the C-40C, used to transport members of the U.S. Congress and senior leaders.

**747** – Boeing’s largest commercial airplane is used as *Air Force One* to carry the president; the E-4B Advanced

Airborne Command Post; and the Airborne Laser Test Bed.

**757** – Four models of the military version of this airplane, the C-32, were built for the U.S. Air Force. They are used to provide transportation for U.S. leaders, including the vice president and first lady.

**767** – This airplane serves as the basis for the 767 tanker for Japan and Italy, as well as the E-767 AWACS used by Japan. It is also the platform for the NewGen Tanker being proposed to replace the U.S. Air Force’s fleet of KC-135 Stratotankers.

## DOUGLAS AND MCDONNELL DOUGLAS:

**DC-2** – The U.S. Army ordered dozens of staff transports in the 1930s based on this airplane.

**DC-3** – By the 1940s, the military derivative, called the C-47 Skytrain, or Dakota, became the standard military transport aircraft for the Allies. It also played a critical role in the Berlin Air Lift.

**DC-4** – The military version of the C-54 Skymaster transport was widely used during and after World War II. A specially built Skymaster,

nicknamed Sacred Cow, became the first U.S. presidential aircraft.

**DC-6** – This late 1940s-era airplane had a successful civilian life, but also served as the platform for the C-118A Liftmaster, used for cargo, personnel transport and aeromedical missions.

**DC-9** – Forty-seven C-9 versions of this airplane were produced, including the C-9A Nightingale, used by the U.S. Air Force to transport injured military personnel.

**DC-10** – Sixty KC-10 tanker/cargo aircraft were built on this platform.

**PHOTOS: (Above)** Boeing’s 707 is the platform for the Airborne Warning and Control System aircraft, known as AWACS, with more than 60 built. They serve with the air forces of the United States, United Kingdom, NATO, France and Saudi Arabia. SHUTTERSTOCK

**(Insets, from left)** The Airborne Laser Test Bed, a Boeing 747-400F; a KC-767 aerial refueling tanker for Italy; a Douglas C-47 Skytrain; the 707-based E-6A airborne command post; a T-43A Bobcat, based on the 737, used as a navigational trainer; the Boeing 707, which was used as *Air Force One*. BOEING