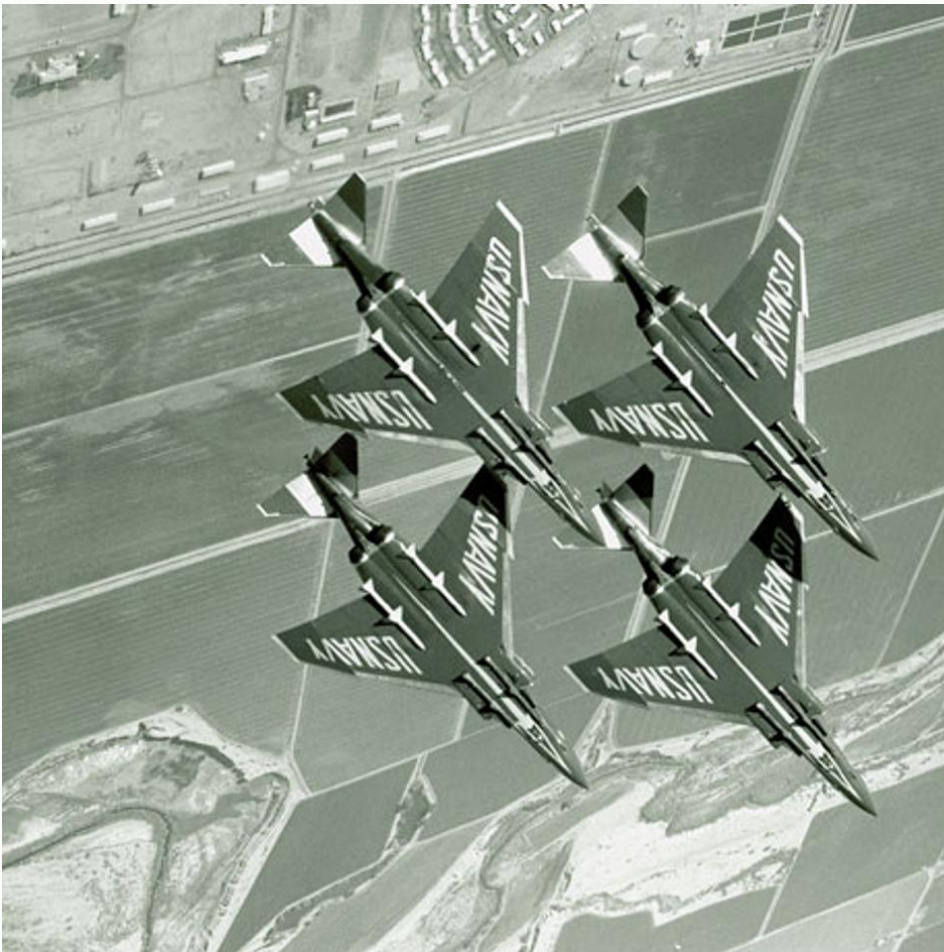


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Blue Angels' Transition To The Super Hornet Will Make Airshows Look A Little Like 1973



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Aerospace & Defense



The Blues in Diamond formation in 1969 flying the McDonnell Douglas F-4J Phantom. US NAVY BLUE ANGELS

The U.S. Navy Blue Angels are getting new airplanes in preparation for the 2021 airshow season. While the team has been flying on a limited basis, saluting emergency workers during COVID-19, it has also been working on transitioning from the Boeing F/A-18 Hornets that it has flown for the last 34 years to the newer F/A-18 Super Hornet.

Since the Navy no longer flies the earlier F/A-18s (often called “Legacy Hornets”), moving to the Super Hornet will again put the Blues into a front-line fighter jet. But it brings an earlier era to mind.

In the early 1970s, the front-line fighter that equipped the team was the McDonnell-Douglas F-4J Phantom, an iconic fighter-attack airplane that gained fame in Vietnam. The Phantom was big, with a 63 foot long fuselage and over 38 foot wingspan. Two General Electric J79 engines with afterburners generated a total 35,800 pounds of thrust and a ton of noise. Crowds loved the burly Blue Angel Phantoms.

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The Blue Angels' current "Legacy" F/A-18 Hornets in the Diamond formation in 2019. US NAVY BLUE ANGELS

Though initially designed in the late 1980s, three decades after the Phantom, the Boeing F/A-18E/F Super Hornet is another large twin-engined, carrier-launched fighter with a crew of one (E model) or two (F). With a 60-plus foot fuselage, a wingspan over 44 feet and a pair of General Electric F414 engines producing a noisy 44,000 total pounds of thrust in afterburner, the Super Hornet is essentially a 25 percent larger, updated version of the Legacy Hornet the team flies now.

Nicknamed the "Rhino," the F/A-18E/F is a bit heavier than the F-4J which means that both have a similar thrust-to-weight ratio. So it's not a stretch to observe that when the Blue Angels start performing in Super Hornets next year, there will be a bit of a Phantom-like quality to their airshows.

"There are going to be [maneuvers] where those airplanes in the [six-plane] Delta formation are going to blot out the sun with their big wings overlapped," says former Blue Angels leader, Navy Captain Eric "Popeye" Doyle. "It'll look like those big F-4s. Then you'll have times where it'll look just like the Legacy Hornets performing."

Transition Team

While the Blues have been doing flyovers and anticipating the resumption of the 2020 airshow season, they've had a second team at work on the transition to the Super Hornet. Doyle, who led the Blues during the 2018-2019 seasons has stayed aboard to lead a smaller team which is overseeing the transition.



Former Blue Angels leader, Captain Eric Doyle, salutes from the cockpit of the #1 Blue Angel F/A-18C... [+] US NAVY BLUE ANGELS

Along with four others, all former Blue Angel pilots and maintenance officers, Doyle has been planning for the acceptance of the first Super Hornets to the Blues' base at Naval Air Station Pensacola, Florida in late June. Eleven aircraft will be delivered this year.

They are the oldest F/A-18E/Fs still in the Navy inventory, early production (Block 21/22) aircraft that the first Super Hornet squadron (VFA-115) used for training Rhino pilots in the early 2000s. Doyle flew Super Hornets in 2003 during their first carrier deployment aboard the USS Lincoln. "We're going to be flying jets that are smidge older than those," he reflects.

First they're being refurbished and modified for the Blue Angels' airshow-specific requirements in Jacksonville, Florida at Boeing's Cecil Field facility. The airplanes will have special fuel pumps added to allow them to fly inverted for longer than a stock Rhino as well as a 40-pound spring linked to the control stick which resists movement, helping pilots to make smaller control inputs. Tanks for airshow smoke chemicals, a stopwatch for timing maneuvers, and civilian-friendly avionics will be added as well as the requisite blue and gold paint scheme.

Lieutenant Commander Garrett Hopkins, who was the Blues' maintenance officer during the 2018-19 seasons, is now on the transition team too. Blue Angel maintainers have Legacy Hornet maintenance down to a science. But they'll have to learn what the Rhino needs and how it wears and tears over a show season.



Blue Angel Maintenance personnel stand at ease before a show. US NAVY BLUE ANGELS

"We're forecasting parts requirements based on the Legacy Hornets but we don't know

yet how the Super Hornets are going to break. It's a bigger airplane so that means we have to haul more on the road with us. We cram our C-130 (known as "Fat Albert") with personnel, parts and tools."

Generators and mission computers are typical items that need to be replaced on the road but their larger size and weight in the Super Hornet makes packing them tough. The specific fatigue life of some parts hasn't been determined because Super Hornets don't have the high number of flying hours that the Legacy Hornet fleet accrued. The composite construction of the Super Hornet will be tougher to inspect and possibly repair as well Hopkins says.

"We see a lot of bird strikes. On the Legacy aircraft they primarily affect aluminum and steel [surfaces]. This will be different but I'm looking forward to it actually."

As aircraft are delivered, Hopkins will better understand their needs. He's already obtaining Super Hornet-specific tools and parts, a tougher job now that the Blues are competing for the same spares as Fleet squadrons.

Maneuvers

The first partially modified Blue Angels Super Hornet was sent to the Navy's flight test center at NAS Patuxent River, Maryland in May to test its new airshow modifications. Doyle has flown some of the show maneuvers in a Super Hornet simulator, giving him initial impressions of how the airplane will fly compared to the Legacy Hornet.

"The aileron roll for example will be a little bit slower, maybe a bit more sluggish. How is it going to roll or loop in [diamond] formation? We have some reasonable idea of what to expect based on [flying] the simulator at Patuxent River but we really have to get in the airplane and feel it."



Blue Angel F/A-18C #3 in a high-G pull. US NAVY BLUE ANGELS

Blue Angel wingmen fly by feel as much as by sight, adjusting the Hornet's engine power without looking at their throttles. The Rhino's throttle-by-wire system may be an advantage since power setting is based on the throttle handle angle.

"In a Super Hornet with FADEC [Full Authority Digital Engine Control] that's going to be darn near the same spot every time," Doyle says, leading pilots to develop simple muscle memory.

The Blues' F-4 teams didn't have to contend with sophisticated flight control system (FCS) software. Maneuvering limits in the Phantom were defined by the things that happened if a pilot overstepped them. In the Super Hornet, the pilot is a "voting member"

in how the airplane responds to inputs Doyle acknowledges.

“You look at a Phantom and if you weren’t smart with your aileron or rudder [inputs], you could depart [stall] it under high G-loading. Now, the flight control computer will tell you, ‘No dummy, don’t add that much rudder here.’”

That computer may require some work-arounds. In the pirouette maneuver done by Blue Angel solos with the current Hornet (which has its own FCS), the pilot points the nose skyward, kicks full rudder and the airplane yaws/rolls around itself. But the stock Rhino’s flight control software won’t let a pilot do that.

“So we had to build in a little ‘notch’ into the flight control computers to allow us to do a pirouette,” Doyle says.

It’s one of many nuances that Blue Angel pilots will learn - from taxiing the larger jets together to using new visual references on the aircraft to hold formation. Aiming to limit wear and tear on the jets, the transition team is looking at ways to fly the Super Hornets a bit less aggressively while still performing an impressive show.

Doyle, who did an operational test tour with the Air Force, plans to apply a methodical approach to readying pilots for the Rhino.

“From the walk-down to the startup to the smoke checks, taxiing, takeoffs, landings... our goal on the transition team is to get as much of [the procedures] ironed out as we can before we hand off operations to the [full] team.”

When the full team flies its first shows with the F/A-18E/F in 2021 it will be well prepared but still learning how to perform with and maintain the new airplane. Will its pilots and the enthusiasts who watch the shows think of the Phantom teams of old?

“They could, Doyle says, “but in no time, it’ll just be the way. The guys who didn’t fly the C/D in the team and fans who didn’t see the F-4s won’t know the difference.”



The Blue Angels taxi out for a show in their McDonnell Douglas F-4J Phantoms circa 1973. US NAVY BLUE ANGELS



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