

# Honeywell HTS7500 Engine Chosen to Outfit New SB-1 Defiant X Helicopter

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Igor Sikorsky once famously said, «the helicopter is probably the most versatile instrument ever invented by man», a thought echoed by many field commanders and soldiers alike. Indeed, helicopters provide a degree of versatility unlike any other present asset: they can be rapidly deployed, navigate through almost every type of terrain and provide firepower and protection. They cover a vast range of operational tasks, including reconnaissance, troops insertion and extraction, intelligence gathering, patrolling, SAR missions, and MEDEVAC. And now the Defiant, the latest arrival from Sikorsky and Boeing, has chosen its engine.

## 1. How the Defiant started

When Sikorsky went on building one of the most successful air manufacturing companies in the world, he started a close relationship with the U.S. Army. Providing decades of experience and legendary models, Sikorsky Aircraft (since 2015 a subsidiary of Lockheed Martin) has done it again with their SB-1 Defiant X attack helicopter.

In 2009, after six years of war in Iraq and eight in Afghanistan, the U.S. Army found it needed to start thinking about renovating its helicopter fleet, which was growing older by the day. Thus, the Army started the Future Vertical Lift (FVL) as an initiative to look into the issue. Then, in October 2011, U.S. Deputy Secretary of Defense Ash Carter made the initiative into a formal program issuing the FVL Strategic Plan (Gourley, 2013).

The FVL program concerns five categories of crafts: light, medium-light, medium, heavy, and ultra. It was in the medium compartment that the Army felt the most urgency to intervene. In 2016, when the U.S. Army Aviation Center of Excellence Maj. Gen. William Gayler declared the Army was looking for a medium helicopter (Judson, 2016), the SB-1, whose development started in 2014, was a perfect candidate.

By 2019, the Future Long-Range Assault Aircraft (FLRAA) program was created as an offspring of FVL to replace the Black Hawk, which has now been in service for a staggering 43 years. Then, just last year, Sikorsky and Boeing announced their SB-1 Defiant X variant.

## 2. Defiant specs

The Defiant is meant to be the most advanced attack helicopter in the world, featuring new weapon systems, more manoeuvrability, unprecedented speed and increased survivability. Boeing (2022) assures «operational effectiveness in multi-domain operations (MDO) and Joint All-Domain Operations (JADO)», a key core of the versatile nature of helicopters. Moreover, the Defiant is designed to bear «extended maintenance-free operating periods» and provide «ease of maintenance in austere environments», thus reducing logistical requirements (Ibid.).

As per Army requirements, the Defiant will house up to 12 passengers, carrying up to a combined 3700 lb (1678 kg) of cargo. It is protected by armour and onboard electronic and physical countermeasures and will be outfitted with miniguns. Preliminary concept arts show the assault version of the Defiant will also allow for up to eight Anti-Tank Guided Missiles (ATGM) to be attached to the fuselage sides. The craft will employ a Fly-by-Wire system, digital engine controls, Multi-Functional Display (MFD) touchscreen and automatic assistance for stability and control (Military Factory, 2021).

Retired U.S. Army Lt. Gen. Tony Crutchfield, now vice president of Boeing Army Systems, says the Defiant will allow the armed forces to rapidly build combat power, especially in theatres that present dispersed lines of operations and logistical bases (ships, small islands), like the Pacific. «You're going to want to move more assets, manoeuvre in confined terrain and survive to build that combat power faster than your adversary can – so you can win», he pointed out (Szondy, 2022). The FLRAA program is expected to start awarding contracts by the end of the year (Perry, 2022). If chosen, the Defiant is set to replace the Black Hawk by 2030 entirely.

### 3. Interoperability

Weapons modernisation is a process distinctively subject to the relationship between armies and companies, but the collaboration between the U.S. Army and the combined efforts of Sikorsky and Boeing dates back a long way and has now allowed for the three to get to know each other well. In particular, more than 90 % of the current U.S. Army rotorcraft fleet features models by Sikorsky and Boeing, which have accompanied U.S. soldiers through more than 15 million cumulative flight hours» (Lockheed Martin, 2022).

Among other things, Sikorsky Aircraft and Boeing paid attention to interoperability and connectivity between the Defiant and army battlefield assets and infrastructures. The craft was «purposefully designed» to enter the competition for the FLRAA program, where is currently challenged by the Bell V-280 Valor prototype. Attention was paid regarding interfacing between onboard electronic systems and U.S. army technologies. The craft's structure is also designed to specifically meet U.S. Army and Marine Corps (USMC) requirements: as regards its engine, for example, Honeywell claims the HTS7500 is «100 % compliant to army specification» and has «proven commonality with already fielded hardware» (Honeywell, 2022).

#### 4. The choice of Honeywell HTS7500 turboshaft engine

The latest addition to the revolutionary model was its engine. Sikorsky and Boeing have chosen the Honeywell HTS7500 turboshaft engine for the Defiant, the last of the long line of Honeywell engines featuring such models as the legendary T55, which powers CH-47 Chinook and MH-47 helicopters. Compared to the latest variant of the latter, the HTS7500 is «42% more powerful», consumes 18 % less fuel, has a «demonstrated sand ingestion tolerance», and offers «the lowest total weight compared to other engines in its horsepower class» (Honeywell, 2022).

In terms of speed, the Defiant should meet the Army requirements of 250 knots (463 km/h, 288 mph), given that in a preliminary test flight on January 5, it reached a speed of 236 knots (437 km/h, 272 mph) in level flight (Szondy, 2022). In short, the HTS7500 will allow the Defiant to fly «twice as far and fast as the venerable Black Hawk helicopter» (Aerospace INSIDER, 2022).

The rear propulsor rotor allows the Defiant to conduct 60-degree turns, to «rapidly decelerate by reducing forward thrust», and «keeps the craft level while slowing down instead of pitching the nose up like a conventional helicopter» (Szondy, 2022), thus improving the pilot's visibility. The model will also be able to land in confined spaces without much delay between the flight phase and the vertical descent phase, thus speeding up the process during dangerous situations, like extractions of VIPs or soldiers and MEDEVAC.

In conclusion, the Defiant is one of the most exciting pieces of military hardware the U.S. Army expects to try. If it wins the competition with the V-280 Valor by Bell and Lockheed Martin, it will be set to make history as the successor of the legendary Black Hawk. Whether it will reach the same level of reliability remains to be seen, but for the moment, every aspect of its development process seem to point towards a truly remarkable craft.

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