# Pulling Gs … on the ground

## Simulator upgrades offer realistic training for Apache pilots

By Stacey Ritter

Bob Rutkowski, a test engineer for Apache Training Systems, "flies" an Apache Longbow Trainer during a test session in St. Louis.

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Imagine flying the U.S. Army's principal attack helicopter—an Apache AH-64D. You climb into the cockpit of the incredibly complex and powerful weapon system, flip the switches and feel the aircraft come to life. You hear the roar of the engines, see the rotors spin to a blur, feel the anxious vibrations of the aircraft as it prepares for lift, and sense the thrill of the mission at hand.

These realistic sensations are what Boeing engineers had in mind when, in 1999, they developed the Longbow Crew Trainer (LCT)—a high-fidelity simulator that prepares Apache pilots and crews to fly real missions in battle zones. The simulator training is used to sharpen pilots' skills by having them practice combat tactics and critical scenarios they would likely experience during a mission—such as bad weather or radio, engine and power failures—without the accompanying danger.

LCTs—deployed worldwide and used for in-theater training in Afghanistan and Iraq—support battalions by allowing pilots ample opportunities to maintain their training hours and rehearse missions.

With 23 LCTs having been delivered, the goal of providing realistic Apache pilot training hasn't wavered. As weapon systems become more complex, the need for more realistic training increases. Accordingly, Boeing is working in coordination with the Army to provide upgrades to the trainer that will ensure the highest level of combat readiness for pilots and crews. Because Boeing has more than 10 years of LCT design and building expertise, the team can complete major upgrades within a few weeks—and meet customer expectations promptly and efficiently.

"Boeing's Training Systems and Services' relationship with the ground commander and troops is truly outstanding," said Randy Nielson, Team Leader, Operator Training Devices, a contractor with the PM Apache Program Management office. "They are not simply a vendor but an active participant with the Army's Project Management Office. They directly affect ground soldiers' ability to do their jobs well."

One of the upgrades that the Boeing–U.S. Army team is implementing is a software change that simulates "pulling g's"—or experiencing a magnitude of the force of Earth's gravity (one G is the force of Earth's gravity) as the aircraft maneuvers.

"The sensation of pulling g's in a non-moving simulator was just remarkable. … a situation hugely important in training," said Lt. Col. Rob Willis, operations officer at the Flight Test Directorate, Aviation Technical Test Center. "The simulator pulled the collective stick (which controls the up and down movement of a helicopter) out of my left hand in response to pulling increased g forces." This level of sophisticated simulator training can influence real life responses in the battle zone and really improve combat maneuvering flight safety, said Willis.

LCTs are also being substantially redesigned to ensure the units remain relevant to soldiers' requirements, current in terms of technology advances, and easily maintained. The enhancements will be integrated into new units and retrofitted into many fielded devices.

One element important to the redesign is the Boeing-developed Next Generation Flight Model software. It's designed to take actual flight-test data and better communicate that data to the trainer, telling it how it should perform and handle. This ensures that if a pilot moves the trainer's cyclic stick (which controls the direction of the helicopter), the amount of pressure used to move the stick would feel the same as moving the cyclic in the actual aircraft—and, most importantly, that the simulator would then perform like the actual aircraft after such control input. The software is raising the fidelity of the LCTs to a highly sophisticated level, providing the most realistic training possible for pilots and crews, and unquestionably saving lives.

"The teaming of the Army with Boeing," said Willis, "allows us to dramatically enhance the training value of the LCT, improving safety and mission effectiveness of the warfighter in the real aircraft." ■

*stacey.l.ritter@boeing.com*