Success Story

SGI and Link: Training U.S. Army Helicopter Pilots in a Realistic Virtual Environment

Preparing Army and National Guard helicopter pilots for the intense conditions of wartime missions presents extraordinary challenges for military aviation trainers. Never easy, training has become even tougher as escalating costs and tightening environmental restrictions continue to limit the use of live gunnery and field training exercises. While aviation simulators can complement live-action exercises, current-generation systems do not provide the realism, intensity, and integration necessary to prepare pilots to operate effectively on the combined arms battlefield.

A team at L-3 Communications, Link Simulation & Training has designed a breakthrough solution to meet these challenges. The reconfigurable Aviation Combined Arms Tactical Training–Aviation Reconfigurable Manned Simulator (AVCATT-A) employs high-performance SGI™ image-generation systems as the core of a sophisticated visual system. The Silicon Graphics® Onyx2® image generator runs Link's RightView software (based on SGI OpenGL® Performer™) and drives a helmet-mounted visual display system. AVCATT-A uniquely combines a commercial off-the-shelf (COTS) solution with advanced features and full functionality, including complete interoperability with the Army's legacy Close Combat Tactical Training (CCTT) databases.

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AVCATT-A presents a visually realistic environment that incorporates capabilities for advanced weaponry training, combat rehearsal with interactive opposing forces, and reconfigurable cockpits to enable training on the latest aircraft configurations. The AVCATT-A solution will help develop the skills of new pilots, as well as prepare experienced aviators, crews, and teams for specific combat or peacetime missions.

One Army, One Simulator: An Integrated Trainer Solution

The AVCATT-A program, based on the "one Army, one simulator" concept, will provide aviation training for both the active U.S. Army and National Guard units. Being developed by Link Simulation & Training under a contract award from the Army's Simulation, Training, and Instrumentation Command (STRICOM), AVCATT-A supports the full tactical mission spectrum of attack, reconnaissance, and utility helicopters.

The transportable simulator will operate stand-alone as well as networked to the Army's armored tank training system, the CCTT program. Interoperability with this system and the Army's command, control, communication, computers, and intelligence (C4I) systems allows battalion or brigade staff personnel to participate along with aviation crews in simulated engagements. Working at stations within administrative and tactical operations centers, headquarters staff and other personnel can participate in combined exercises, for example, controlling battlefield support elements and combat force deployments.

AVCATT-A also benefits by being able to take advantage of legacy CCTT database elements, including geo-specific terrain data and databases developed from standard digital topographic data. Converted to OpenFlight files, the legacy data can be leveraged to make the system ready sooner for mission rehearsals. The interoperability also protects the Army's investment in equipment, terrain, and cultural models—road, bridge, and runway data.

Choose Your Weapon, Cockpit, Airspace, and Terrain

Army trainers know that to ensure training effectiveness, a simulator must provide out-the-window and sensor displays with enough visual realism for pilots and their crews to effectively perform and practice aviation duties. The environment must be true-to-life, high-intensity, and task-loaded. AVCATT-A combines Link's run-time software with high-performance SGI platforms for unprecedented realism to mimic real-world environments and events. Offering tremendous flexibility to trainers, AVCATT-A can simulate a wide array of mission equipment and virtually limitless environmental elements, including terrain, natural and cultural features, weather conditions and atmospheric effects, friendly and opposing weapon systems, aircraft configurations, vehicles and other equipment, and interactive competing forces. This capability lets aviators train under a broad set of conditions—smoke-filled battlefields, blowing-snow whiteouts, dust and sand storms, low cloud cover, high winds, etc.—replicated in daytime, dusk, or nighttime settings.

While most existing simulators support a single aircraft configuration, the reconfigurable AVCATT-A program offers highly realistic and functional cockpits representing the Army's Bell OH-58D Kiowa Warrior, Boeing AH-64A Apache, AH-64D Longbow Apache, CH-47D Chinook, Sikorsky UH-60A/L Blackhawk helicopters, and next-generation Comanche attack helicopters. Duplicating specific aircraft configurations in real-world situations helps helicopter pilots survive and successfully complete military missions in the dangerous and unpredictable settings they face defending national interests.

AVCATT-A also provides performance feedback and theater or home station viewing for after-action reviews. This enables pilots, crews, and teams to not only develop and practice their flight skills but also fine-tune them for maximum effectiveness and safety.

Onyx2 Provides State-of-the-Art Realism

To achieve the database interoperability, deployability, and configuration flexibility that characterize AVCATT-A, Link uses the image-generation technology of the Onyx2 visual workstation and the computational and I/O capacities of the SGI™ Origin™ 2000* server platform. Each simulator includes a dual-rack Onyx2 system and an SGI Origin 2000 deskside system. The Army will initially deploy six units with combined processing capacity of 18 graphics pipelines, 72 raster managers, and 72 CPUs.

Image-generation solutions for rotorcraft simulation are the most complex in the business. The operational mission of the helicopter ranges from low and slow in the trees, where high scene complexity is critical for providing necessary flight cues, to nap-of-the-earth flight where the visibility range is 12 kilometers. Correlated sensor visuals are also critical to simulate the variety of infrared, low-level television and radar displays available on the real aircraft. These demanding requirements necessitate systems that can provide

power and flexibility. SGI meets these needs with an integrated hardware and software solution that uses terrain database elements to create map-accurate views complete with dense cultural objects.

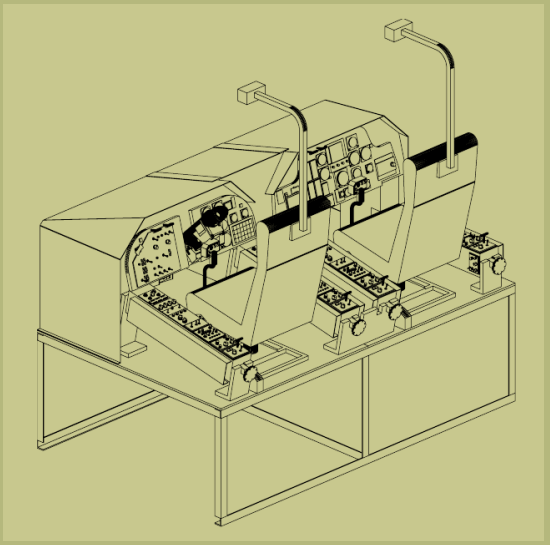
Partnering for Worldwide Preparedness

The development of AVCATT-A represents the best in project team collaboration for delivery of a complete, customized solution. Working to meet the Army's extensive operational requirements, Link has integrated both technical and support resources to build, deploy, and maintain the sophisticated simulator. Link provided computer system integration and project management assistance, including engineering support for legacy database conversion. Additionally, Link and SGI have collaborated to provide worldwide support for the AVCATT-A solution, allowing the Army and National Guard to deploy the AVCATT-A solution wherever necessary to ensure preparedness against air defense threats.

On the Horizon

Additional AVCATT-A training systems will be deployed to Army and National Guard units over the next six years. These systems will not only provide flight training for current military aviation systems, but will offer the U.S. Army the scalability, portability, and maintainability needed to meet changing and expanding instructional requirements. AVCATT-A maximizes the Army's investment and ensures long-term system usefulness through its use of open-standard, modular COTS image-generation technology from SGI.

Calm or storm, war or peace, Army and National Guard aviators trained using AVCATT-A will be better prepared to confidently carry out their missions of national concern and consequence.



The Solution Elements

System integrator:
L-3 Communications, Link Simulation & Training

Image generator:
Silicon Graphics Onyx2 InfiniteReality2™
SGI Origin 2000 server
Link RightView run-time software

Display:
Helmet-mounted display

Database:
Enhanced, portable CCTT

Global support:
Link
SGI

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