

# BAG END PLAYS SMALL, BUT SIGNIFICANT, ROLE IN THE NAVY'S NEW "KNIGHTHAWK" HELICOPTER PROGRAM

## BAG END GIVES HELICOPTER TRAINER REALISM

United States Navy helicopter pilots Lieutenant Commander Barbara Gordon, left, and Lieutenant Kirk Hansen, right, give a 'thumbs up' to the Navy's new MH-60S Tactical Operational Flight Trainer, the trainer for the Navy's newest helicopter, the Sikorsky MH-60S "Knighthawk." Lockheed Martin, developer and manufacturer of the trainer, used a BAG END D18E double-18 subwoofer system to provide the realistic sound of a pair of powerful GE turboshaft engines roaring just a few feet over the pilots' heads.

The United States Navy recently took delivery on the same day of its newest aircraft, the MH-60S "Knighthawk" helicopter, and its companion, the MH-60S Tactical Operational Flight Trainer, at the North Island Naval Air Station in Coronado, California.

What's significant is that, to BAG END Loudspeaker Systems of Barrington, Illinois, at least, the realistic sound new "Knighthawk" pilots will be experiencing in the cockpit of trainer is generated by a BAG END D18E-I double-18 subwoofer controlled by a BAG END ELF-1 (Extended low frequency) signal processor.

The MH-60S Tactical Operational Flight Trainer, manufactured by Lockheed Martin Naval Electronics and Surveillance Systems (a division of Lockheed Martin Corporation), is equipped with many features allowing pilots to familiarize themselves completely with the new aircraft's configuration characteristics so they can step into the cockpit of the MC-60S helicopter ready to fly.

"Lockheed designed a software architecture that is extremely flexible in order to create virtual environments that envelop the trainee pilot. The BAG END subwoofer and ELF-1 low frequency signal processor are an important part of a software syntheses of an integrated surround sound environment," said Kiffin Bryan, integration and test engineer for Lockheed-Martin's Naval Electronics and Surveillance Systems section. "The subsonic capabilities are critically important to recreate the experience of sitting directly below a pair of powerful T700-GE-401C turboshaft engines. Training becomes far more effective when all the senses are engaged."

After spending 20 minutes at the controls of the trainer to gain some 'hands on' knowledge, the Navy's Officer-in-Charge of the Fleet Introduction Team at North Island, Capt. Greg Hoffman, said, "The new trainer is a significant leap forward and will be crucial to keeping our air crews on the cutting edge. It will provide effective, dynamic and realistic training that will increase pilot skills, improve operational safety, and raises the bar for realistic training."

The MH-60S Tactical Operational Flight Trainer incorporates a wide variety of features that give the pilot the ability to familiarize himself or herself with the operational characteristics of the Knighthawk. It has

a wide field of view; a day/night high fidelity visual system and the ability to use night vision goggles, among other things. The trainer's computer system includes expandable hardware and software architecture to program in a wide variety of training mission scenarios, from combat search and rescue to airborne mine countermeasures.



BAG END's subwoofer system adds a significant touch of realism, according to Bryan. "The BAG END D18E-I subwoofer is installed right in the cockpit of the trainer and adds a very realistic touch of the same engine and rotor noise and volume the pilot will experience under real-time flight conditions," she said. "And while this is not very analytical, we really loved the sound of the Hellfire missiles being launched by the trainer."

The Sikorsky MH-60S "Knighthawk" helicopter is designed to support the Navy's "Helicopter Master Plan Combat Support Aircraft" mission requirements. The MH-60s is an amalgam of the Army's UH60L Black Hawk and the Navy's SH60B Seahawk. The airframe provides unique naval capabilities including vertical replenishment, combat search and warfare support and airborne mine countermeasures.

Both the Navy and Lockheed Martin were so pleased with the performance of the BAG END subwoofer system, it is being incorporated in another trainer under development by Lockheed for the Navy. That trainer, for the Navy's new SH-60B helicopter, is scheduled for delivery late this year.

Lockheed Martin NE&SS, a division of Lockheed Martin Corporation, is a leader in the design, development, installation, operation and integration of training and simulation systems for global defense. Its line spans the training continuum of live, virtual, constructive and test-instrumentation domains for flight, naval and ground system applications.

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