



## A new flight simulator provides a one-of-a-kind training opportunity for aerial firefighters

By Dennis W. Brown

**A**t 12 miles out, I can see a faint smoke column through the front windscreen of my Grumman S2-T airtanker. I make initial radio contact on Air Tactics 1, calling the air tactical group supervisor (ATGS) in orbit over the fire. After I establish contact with the Buckhorn Air Tac, I'm cleared into the airspace at an altitude of 7,500 feet with an altimeter setting of 3001. Buckhorn Air Tac is in orbit at 8,500 feet over the incident. Before being handed off to Lead 5-2, I receive a thorough briefing of hazards, other aircraft in the area and the overall operation objectives. Arriving on scene, I pick up Lead 5-2 below me, making a dry run on the right flank of the fire; a Skycrane and a Bell 212 helicopter are holding at the road east of the fire. Listening in on the helicopter air-to-air frequency, I determine the ATGS has assigned both helicopters to the left flank.

I contact Lead 5-2 and let him know that I have arrived on scene and that I saw the dry run he just made; I also inform him that I have a visual on the two helicopters on the left flank. Lead 5-2 indicates we will work the right flank, providing some structure protection drops. After giving me the target description, coverage level desired, escape route and minimum altitude for the drop, he advises that he has me in sight and will join up with me on the downwind leg. I spot the lead plane and fall in behind him at a comfortable ¼-mile to ½-mile distance. As we turn base, I can hear the ATGS talking to the helicopters, ensuring they remain clear of our drop area and escape route.

Lead 5-2 and I make final, minor corrections as the smoke starts to lie across the proposed line. Lead 5-2 indicates the smoke is not bad and should not be a problem, but to break off the run if I'm not

comfortable with it. I continue down on final, watching the lead plane, my air speed and my altimeter for my lineup and minimum-drop altitude. Just as I wonder whether I'll have to pull off the drop run due to less-than-adequate visibility, the smoke begins to thin out and I can see the structures and the planned drop area. I make my best estimate on when to release the load and then punch it off, start to power up and gently climb out and turn to the left as planned. The ATGS provides immediate feedback: The drop was right on line, but a little too late on the release. I make a mental note for correction on my next load. On my exit and climb out, I can see and hear Tanker 23, a P-3 Orion airtanker, arriving on scene and checking in with the ATGS. The pilot should be able to use a portion of his load to fill the gap I left in the line.

Flying back toward the airtanker base for reload, I relax and snap back to reality: I am not in a Grumman S2-T airtanker, but rather sitting in a flight simulator cockpit in the Wildland Fire Training and Conference Center at McClellan, Calif. The retardant drop was simply a well-orchestrated simulation, with several role players flying the other aircraft. But thinking it's real is not uncommon. Even though the simulator does not have motion capability, it's not unusual for experienced aerial firefighters and firefighting pilots to become absorbed and forget they are not really moving at all.

### A New Training Tool

The Aerial Firefighting Simulator at McClellan is a multi-phase project developed by the Aviation Unit of the U.S. Forest Service (USFS)



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Pacific Southwest Region. The first phase is in operation and is primarily designed to address fixed-wing operations on wildland fires; the second phase focuses on helicopter operations. Both phases of the project are contracted to Los Angeles-based ATC Flight Simulators, who in turn has sub-contracted the aerial firefighting software development to Silicon Studios in Laguna Hills, Calif. Delivery of second-phase equipment and software is expected this fall.

The intent of this project is *not* to train people to be airtanker or helicopter pilots; it is to provide a safe environment to aid in the training of pilots and aerial supervision students who are new to aerial firefighting, as well to improve the knowledge and performance levels of current aerial firefighters. There is no other place where pilots can practice using standard operating procedures (SOPs) and terminology, get a feel for the fire environment and the Fire Traffic Area (FTA) and respond to changing incident conditions—all in a scenario that can be stopped and restarted when necessary.

A typical simulator scenario: Two P-3 airtankers, two S2-T airtankers, a lead plane, the ATGS platform and a Skycrane helicopter all work the same fire simultaneously (the simulator is flexible enough to allow for nearly any different combination of available aircraft). The participants can all see and interact with each other. They take effective suppression action on the fire, dropping retardant or water as appropriate. Trainee pilots experience joining up with the lead plane, entering into the FTA, observing the drop of the tanker ahead and tying into that drop, all while hearing and using the communication terms and SOPs used during real incidents. The scenarios are entirely interactive, with the trainee pilot or ATGS flying in their own aircraft and responding to the incident as it unfolds.

What can pilots hope to learn through the use of the simulator? In addition to providing a valuable training tool for pilots new to aerial

firefighting, the simulator is also useful for aerial firefighters looking to expand or improve their skills. Flying a variety of scenarios with other aircraft on the same fire—with the capability to pause, debrief and continue—cannot be duplicated in actual flying conditions. Many very experienced ATGS officers and lead plane, airtanker and helicopter pilots who have used the simulator see real value in it. The simulator is perfect for pre-season refreshers, or just knocking the rust off of your radio and cockpit skills after a long winter. The possibilities are really only limited by imagination and time.

### Progressing in Phases

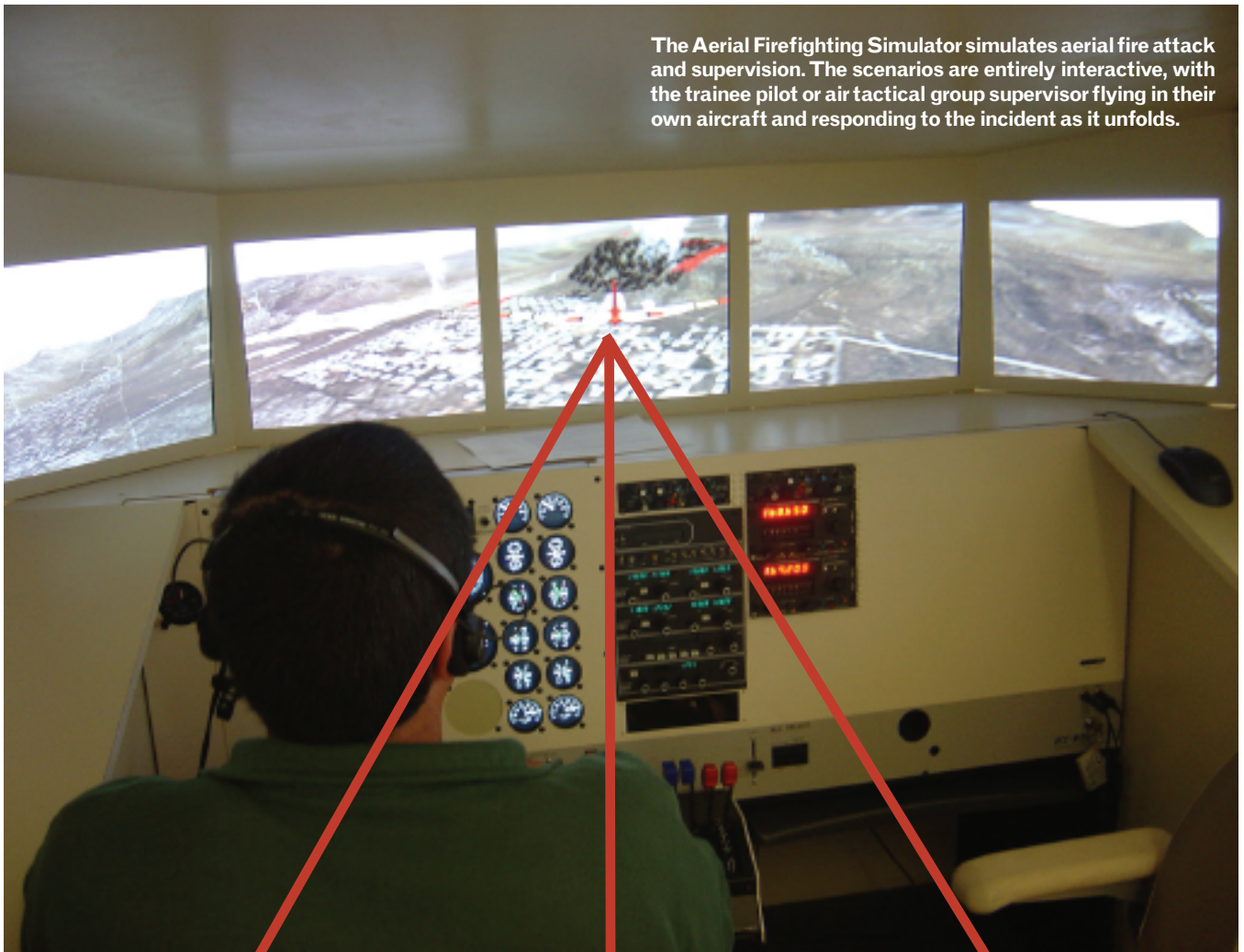
Phase I of the simulator project consists of three complete fixed-wing cockpits (one single-engine and two twin-engine aircraft). These units serve as FAA-approved flight simulators when running the designated operating system. However, we operate them using the Microsoft Windows operating system, running an Aerial Fire Suppression program that is not FAA-approved. The program allows all three of the stations, plus four additional joystick stations, to operate together on a variety of incidents. In the aerial-suppression mode, the aircraft can drop retardant or water or serve as command and control (ATGS/helicopter coordinator [HLCO]). Aircraft available in Phase I include airtankers (P-3 Orion, Grumman S2-T or military C-130), helicopters (Sikorsky Skycrane, Bell 212 and Bell 206) and ATGS/aerial supervision module (ASM) platforms or lead planes (King Air and Aero Commander).

Phase II has been awarded and will provide the simulator with two full-service helicopter cockpits (not FAA-approved) with visual displays. Flight controls and instrumentation will resemble a single-engine Type II or Type III turbine helicopter. In addition, Phase II includes improvements to the existing software, including more realistic timber type models and the addition of different aircraft models (Neptune P2V, DC-3T jump ship and a Chinook helicopter). Operational improvements in Phase II will include the development of a rappel option, tanked and bucket helicopter operations and scenario-playback options. Eventually, we hope to go beyond Phase II to develop databases that will allow us to simulate “all-risk” scenarios, such as floods, earthquakes and terrorist attacks, in a high-resolution urban setting.

### Unexpected Uses

Although the simulator was originally designed for aerial supervision instruction (ATGS/ASM and HLCO), we recognized early on that airtanker and helicopter pilots would benefit tremendously from this type of training environment. But the simulator's uses don't stop there.

The Aerial Firefighting Simulator simulates aerial fire attack and supervision. The scenarios are entirely interactive, with the trainee pilot or air tactical group supervisor flying in their own aircraft and responding to the incident as it unfolds.



**These three screen shots show what trainees actually see through the simulator. *Left:* In the aerial-suppression mode, pilots can watch other aircraft operations and practice critical SOPs and communication skills. *Center:* Simulator participants can perform water drops using several different helicopters, including this Sikorsky Skycrane, a Bell 212 and a Bell 206. *Right:* One of the advantages of the simulator: It provides trainee pilots an opportunity to experience operations inside the fire traffic area.**

Recently, students from the Aviation Safety for Emergency Response program at the University of California-Davis used the simulator in their Human Factors, Operational Risk Management and Operational Communications courses. In the classroom setting, the simulator is used in a slightly different manner. Role players man the cockpits while 10 to 14 students in a classroom listen to and observe the incident unfold on an overhead projector. The scenario director selects a variety of views of the incident, such as the ATGS' right-hand window view, front view from an airtanker and helicopter downward view. The students make notes of problems or positive

observations relating to the specific training they've received, such as poor risk-management decisions, poor communication procedures or human-factors issues. At the conclusion of the scenario, the group of students develops a plan on how to improve on what they have just seen and heard. They then brief the role players on the desired changes, and the scenario is replayed and re-evaluated.

Numerous pilots and agencies have participated in simulation sessions so far, and many more are planned. In addition to the UC-Davis courses, the USFS has used the simulator for interagency ATGS and ASM refresher training and two interagency Helicopter

PHOTOS COURTESY USFS



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Manager sessions. In addition, private companies and other public safety agencies can rent the simulator for specific training. Evergreen International took advantage of this option in preparing its 747 flight crews for working in the fire environment. Both Los Angeles County Fire Department helicopter pilots and a contingent of air-attack and Birdog pilots from British Columbia completed training on the simulator in April. Interest from numerous states, Canadian provinces and several foreign countries, including

Australia, Hong Kong, Spain and Argentina, ensures that this new training tool will remain in high demand.

### **A Training Transformation?**

The effect this project will have on the aerial firefighting world is yet to be seen; however, the simulator provides tremendous promise in improving the effectiveness and safety of aerial firefighting operations. New scenarios, software and equipment will continue to improve this tool, but it will be the willingness of the aerial firefighting and emergency response communities to make the commitment to the training—and the associated costs involved—that will ultimately make the difference during real incidents. ▲

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**A typical simulator scenario involves multiple users and aircraft to create a training situation that's as close to reality as possible. Participants work the same fire simultaneously, seeing and interacting with each other.**

PHOTO COURTESY USFS