Pushing the Edge of the Virtual Envelope

By Cdr. Christian Buhlmann, USNR

Today's military aircraft have evolved into flying computing platforms driven by onboard networks of weapons, sensors, and flight control systems. Accordingly, aircrew at the U.S. Naval Test Pilot School (USNTPS), NAS Patuxent River, Md., "are being tasked more and more with software-based systems evaluation," CO Commander Paul Sohl said. The school's Airborne Systems Syllabus trains developmental and operational testing personnel to evaluate the software components of current and future Naval Aviation platforms.

"Forty years ago we spent our efforts building multiple versions of aircraft that would go faster, higher, and farther. Now we build one aircraft and for about 20 years we transform the systems on it," stated Lieutenant Commander Denis Tri, Airborne Systems department head. "We spend less on developing the airframe and more on what systems we put into that airframe."

The systems syllabus utilizes a combination of flight, classroom, and trainer based assessments that leads students through a four phase approach: demonstration, simple evaluations, general analysis, and specific evaluation of software-driven data. The emphasis on software analysis is a new addition to the curriculum, and an area of additional curriculum development for the school. "Software testing is in everything that we put in the air," LCdr. Tri explained, and students must learn how to assess if software is properly correlating and representing the airspace and battle space environment.

During a software analysis exercise, the students evaluate a current version of system software on an aircraft, then determine changes they would like to implement. The software coding is updated accordingly, and the changes are assessed in the aircraft. This allows students to see how changes impact a real
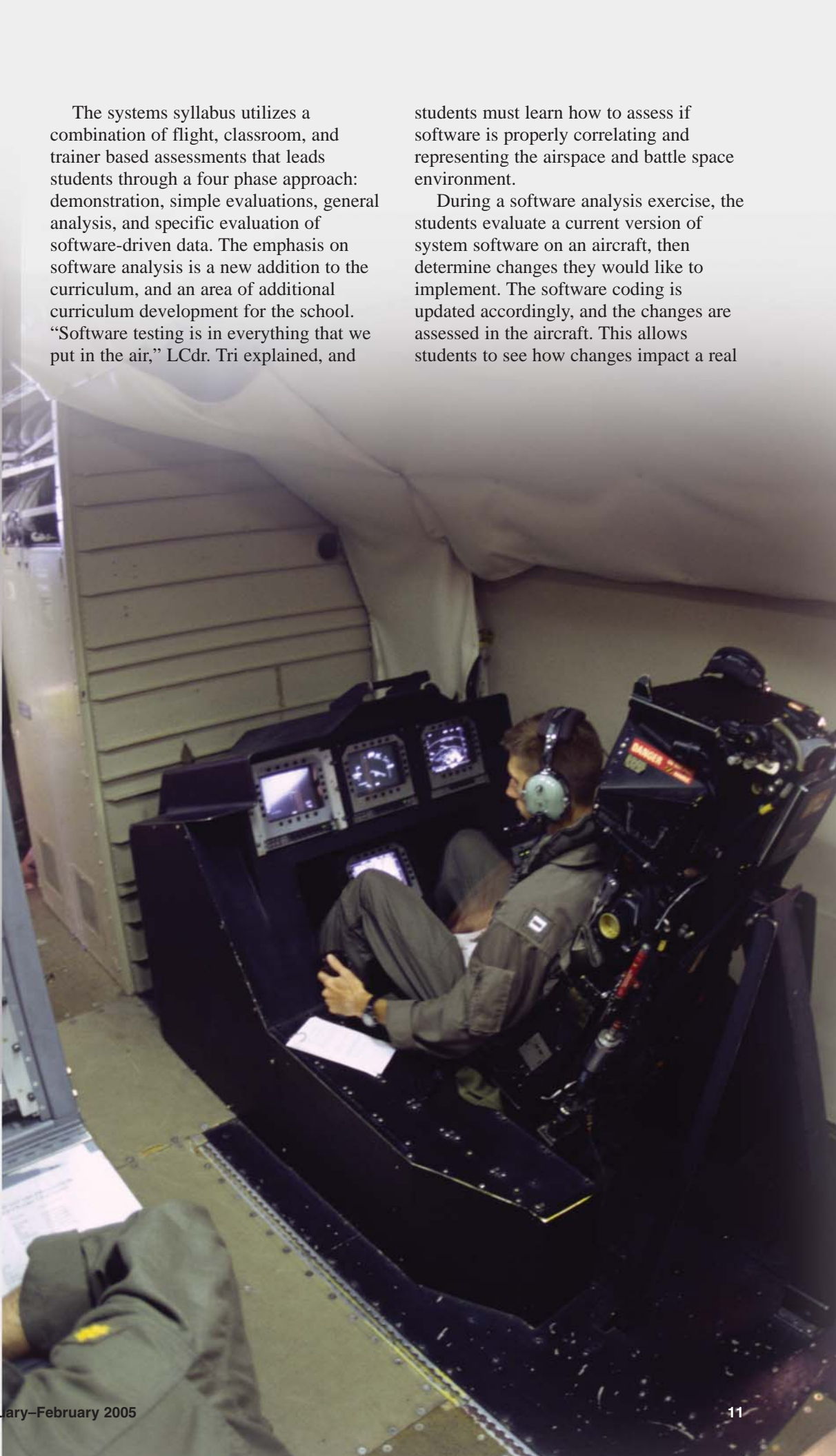
Above, the systems integration analysis station aboard the NP-3D allows students to analyze the performance of the other aircraft stations. Right, the Hands on Throttle and Stick trainer gives students first-hand experience with avionics and systems displays.

aircrew environment. Students begin to understand the tradeoffs in time and monetary cost of making different levels of change to a system. The outcome of the entire evolution is that students see what it takes to be a "flying scientist"— discovering the differences between what the software shows as reality and what in a controlled test environment is reality.

To allow students to learn how to evaluate systems integration performance, USNTPS employs two NP-3D ASTARS (Airborne Systems Training and Research Support) aircraft in the systems test and evaluation environment. These aircraft enable students to see the integration of head up displays, radar, and electro-optic and navigation systems in order to evaluate individual system tolerances while simultaneously assessing the overall system for effectiveness in a variety of mission areas.

The NP-3Ds are configured with an APG-66 radar, a Forward Looking

Above, LCdr. Bill Suggs, left, then-department head for the systems curriculum, confers with two students during a radar/navigational systems training flight.

Left, an NP-3D returns from a training mission. The school utilizes two of these specially configured aircraft in the systems syllabus. Above, the NP-3D's flight deck includes a unique center display, containing the FLIR, radar, and navigation tools. Below, a student checks a setting at the navigation assessment station.

Infrared/TV system, and other systems enhancements. A cockpit station demonstrator allows students to understand the aspects of Hands On Throttle and Stick designs and how that human interface system can maximize the warfighter's effectiveness in operating the systems. To keep the level of test and evaluation training in line with fleet systems, the ASTARS aircraft are expected to receive important upgrades, such as low-altitude navigation and targeting for night, updated FLIR, and additional enhancements to the radar systems.

As Naval Aviation's mission moves forward with increasing emphasis on software technologies, the USNTPS Systems Syllabus continues to produce testing personnel who are skilled in this arena. Their training will ensure that Naval Aviation's front-line warfighters can execute their missions with the best aircraft and systems that America can build. ✈