Fort Worth Hosts U.S. Naval Test Pilot School Short Course Program

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One of the keys to conducting a successful aircraft flight test program is having an engineering corps that is well versed in aircraft stability and control and the test techniques involved in actual flight testing. To that end, Aeronautics-Fort Worth hosted the U.S. Naval Test Pilot School (USNTPS) Airplane Flying Qualities Test & Evaluation Short Course June 11-22.

The two-week course curriculum consisted of two phases: an Academic Phase (Week 1) focused on the engineering analysis of airplane longitudinal and lateral stability and control; and a Flight Phase (Week 2) during which the attending Aeronautics engineers conducted an actual flying qualities evaluation in an instrumented airplane provided by **Calspan Corporation**. The course follows the USNTPS teaching methodology of theory to practice that involves academic instruction, lab simulation, flight briefing, flight demonstration, data acquisition and reduction, and flight reporting.

One of the challenges with hosting the course in Fort Worth was the availability of a flight simulator that could adequately support the course objectives. To meet this requirement, engineers at the Flight Simulation Laboratory developed an indigenous Flying Qualities Simulator. This required the integration of T-50 flight control software with an F-35 control stick and throttle quadrant, generic rudder peddles, and a Quantum 3D computer system driving a three dimensional projection display. Featuring a capability to vary stick force and aircraft dynamic characteristics, the Flying Qualities Simulator proved well suited for student evaluation of aircraft response to various flight control inputs. The fidelity of the simulated flight environment enabled the students to practice classic flying qualities evaluation techniques including pitch/rudder doublets, steady heading sideslips, and bank and pitch angle captures, etc. In addition, the students were able to perform mission relatable flying tasks like air-to-air target tracking and in-flight formation station keeping and assess flying qualities in accordance with the Cooper-Harper scale, the flight test profession's standard rating scale.

Flying Qualities Simulator in action. Aeronautics' Brian King receives instruction on flying qualities test techniques from USNTPS instructor Jim Lewis. At right, Nathan Merritt conducts a pre-flight of Calspan's F-33C prior to a flying qualities test flight with Calspan test pilot Dave Culbertson.

Of course there's nothing like going through the paces of an actual airplane test flight, and that's exactly what each student was able to do in **Calspan Corporation's F33C Beechcraft Bonanza**. Under the supervision of former Navy and now **Calspan test pilot Dave Culbertson**, each student conducted a 1.5 hour test flight during which they performed a full range of flying qualities evaluation maneuvers. Configured with a unique instrumentation and data recording system specifically designed to support USNTPS requirements, the F33C enabled each student to capture key flight parameters for post-flight analysis as part of a Navy Daily Flight Test Report.

Nathan Merritt, a senior stability and control engineer assigned to the F-35 Program, summed up his experience, "The course gives us a hands-on opportunity to walk through our flying qualities job using proven flight test techniques and methodology. It enhances our understanding and appreciation of what the pilot thinks is important in designing a quality airplane. In all it was a great learning experience that blended theory with an actual hands-on flight test experience to highlight the fundamentals of evaluating how well an aircraft flies."

Conducting a two week training course of this nature doesn't happen without a considerable amount of planning and coordination. This was especially true when it came to safely executing a 12 event flight schedule with a single aircraft and only one pilot during the Flight Phase. In this regard LM Flight Operations had a big hand in making it all work. Whether it was daily flight schedule coordination with Navy Joint Reserve Base Operations, airspace deconfliction with other LM flight events, providing local weather forecasts, or flight line support, LM Flight Operations proved key to the execution of efficient and safe flight operations that met all Flight Phase objectives.