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Information Summary

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Aerospace Careers:
Test Information Engineers

The role of test information engineers (TIEs) at NASA's Dryden Flight Research Center is to ensure that flight data generated during a research flight are accurately transmitted to data acquisition facilities on the ground. The flight data are processed and properly displayed in Dryden's Mission Control Center (MCC) for project engineers and researchers. The results of their work mean quick and easy access to important flight data by project engineers and researchers. The Test Information Engineering Group is a part of Dryden's Systems Engineering Branch.

Test information engineers ensure that flight data are processed and properly displayed in Dryden's Mission Control Center (shown here).

The Work of TIEs

A test information engineer is one of the busiest people at Dryden before, during and immediately after a research flight. His or her responsibilities are broad — they are the liaison between a flight research project, the Western Aeronautical Test Range (WATR), and the MCC.

The WATR is the highly automated, multi-faceted complex that provides aerial tracking and groundbased data acquisition and display systems used on nearly every mission flown at Dryden. Most of the data WATR acquires and processes are displayed in the MCC as the research flight takes place.

Flight data acquisition begins on the research aircraft where sensors and other data-collecting devices measure a variety of conditions related to a specific research project or the aircraft itself. Typical conditions that are measured are structural dynamics and loads, air pressure distribution, thermal heating, angle of attack, attitude and speed. The measurements are converted into electrical signals that are transmitted to WATR acquisition and processing facilities and displayed in the MCC.

As the scheduled flight draws near, TIEs work closely with project engineers and managers, and also instrumentation engineers who are responsible for the aircraft's data-collecting sensors. TIEs need to know all of the control room requirements of these people. It is important that the engineers be familiar with all of the flight data that will be transmitted from the aircraft through the WATR data acquisition systems and into the MCC where the data will be closely monitored — as the flight is taking place — by many project people.

TIEs verify that the MCC can support all of the data acquisitions during the flight and can display appropriate information at each MCC workstation and display console. If additional MCC support is needed to meet flight project requirements, the TIE assists in coordinating the design and validation of the new or upgraded system, along with the appropriate software needed to display the additional telemetry from the aircraft in the MCC.

On the day of a flight, TIEs are responsible for the correct configuration of all the monitors and displays in the MCC, including accuracy tests of the flight data software associated with the flight. This preflight process includes checks of the MCC flight data recording system that give project officials a flight playback capability to review and analyze research and performance data after the flight has ended.

Once the TIE carries out the final checks of the MCC systems and verifies that the complete data acquisition system is flight ready, he or she will be in the MCC where data tracking, acquisition, or display issues can be resolved if there are problems during the flight. If a problem occurs, the TIE will instantly help MCC or WATR personnel troubleshoot until the system is fully operational again.

Following the flight, the TIE coordinates efforts to retrieve and store the recorded flight data to make it instantly available for review later by project engineers and researchers.

The People and the Projects

The Test Information Engineering Group is associated with all research projects at Dryden. One example is the F-15 Advanced Control Technology for Integrated Vehicles (ACTIVE) research aircraft that was flown to study the use of a thrust vectoring system linked to the aircraft's flight control system. Others are the F-18 Active Aeroelastic Wing, a project that will study wing warping (first used by the Wright Brothers on an airplane in 1900) as a way of achieving improved aircraft performance and fuel efficiency and the F-18 Systems Research Aircraft, a testbed for new flight control components.

Much of the work on current flight projects is overseeing upgrades of systems software, validating integrity tests, and making sure the upgrades are compatible with MCC capabilities.

Several projects in development stages that TIEs are assigned to are both unique and significant. They include the hypersonic prototype X-43, a scaled vehicle that will be carried to an altitude of about 100,000 feet on the nose of a Pegasus® booster rocket where it will be released to test a supersonic ramjet engine (scramjet) at speeds of more than 7,000 mph. Another project is the X-33 demonstrator for Reusable Launch Vehicle (RLV) technologies.

Education and Experience

Individuals interested in a career as a NASA test information engineer should possess at least a bachelor of science degree in aeronautical engineering, or another discipline related to aerospace technology. They should also have a solid background in mathematics, science and the fundamentals of aeronautical research.

TIEs must also have excellent problem-solving skills and have the ability to work independently, with minimal supervision. Strong skills in computer operations and programming are necessary, along with the ability to communicate with researchers and engineers of all disciplines and at all levels of management, not only at Dryden but with individuals at other NASA centers, other government agencies, and commercial aerospace firms.

All major aerospace companies have flight test branches where engineers work in positions that would provide career experience for a future NASA test information engineer. Within the federal government, similar engineering positions can be found in the Federal Aviation Administration and also in the flight test branches of the U.S. armed forces.

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The Western Aeronautical Test Range (WATR) is the highly automated, multi-faceted complex that provides aerial tracking and ground-based data acquisition and display systems used on nearly every mission flown at Dryden. (The high altitude corridor of the WATR is indicated by the box in this map of the Southwest.) TIEs are the liaison between a flight research project, the WATR and the Mission Control Center.