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Information Summary

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Aerospace Careers: NASA Research Pilots

Research pilots at NASA's Dryden Flight Research Center have helped shape modern aeronautics. For more than a half century their names have been synonymous with many of America's greatest aviation developments and achievements.

Tests and verification work in simulators, laboratories and wind tunnels is necessary in the evolutionary development of new aircraft designs, components and systems. But the final proof-of-concept testing is the work of NASA pilots and it takes place in the most unforgiving laboratory of all — the sky above.

What is a NASA Research Pilot?

Research pilots at Dryden are members of the Flight Crew Branch, a section within the Flight Operations Directorate. Each pilot is qualified, or rated, to fly several different types of aircraft and usually assigned as a project pilot on more than one research project.

Being a NASA research pilot is challenging, demanding and occasionally risky. There are few occupations to which the job can be compared, but the rewards of being a research pilot are generous. Each of these skilled and experienced aviators takes pride in knowing that nearly every aircraft flying incorporates a design element, component or a system that can be traced to an aeronautical project flown by a NASA pilot.

The Systems Research Aircraft (SRA) is one of the modified military aircraft used for research at Dryden.

The NASA Airborne Science program operates two ER-2s and this DC-8 as flying science laboratories.

Tools of the Research Pilot

Most research flying today at Dryden is in modified former military or civilian aircraft. These aircraft include those used for testbeds, mission support, launch vehicles and safety chase. Airborne Science operates two ER-2s and a DC-8 as flying science laboratories. The fleet of aircraft includes a B-52 used to airdrop experimental vehicles and test articles. Also maintained at Dryden is a Boeing 747 modified to carry space shuttles.

Dryden pilots use simulators to train for specific research flights. With the look and feel of a real cockpit — including a display screen projecting outthe- window views of the simulated flight — simulators allow pilots to become familiar with difficult, unusual and high-risk events that may occur during flight. Examples are piloting tasks while flying in zero-gravity conditions, high angle-of-attack maneuvering, difficult landing flare techniques, and flying under adverse environmental conditions.

Simulators are also a vital part of the aeronautical research and development process. NASA pilots spend many hours with engineers to develop, test and validate new ideas and concepts on simulators. The pilots “fly” simulators to study the predicted performance and flight characteristics of their research aircraft.

Before simulators were developed, new ideas and concepts could be validated only in flight, raising the chances of accidents and injuries. Simulators lower these risks significantly by exposing design and integration problems. The pilots use computers — and their experience — to help solve these problems before flight.

The People and the Projects

NASA research pilots do more than fly. The education, training, and skills they possess also rank them as aerospace engineers. They become important members of each research project to which they are assigned. As a project moves from the planning stage to the day of flight, the pilots offer valuable technical advice in a wide range of disciplines that include vehicle design, handling qualities, aerodynamics, flight safety, performance and management of flight systems, guidance and navigation systems, energy management techniques and physiological factors.

As members of project teams and the ones who fly the aircraft, research pilots also participate in every flight planning decision. Their expertise and flying experience significantly influences the direction the research effort will take and its rate of progress, but the paramount issue in all flight planning decisions is flight safety — not just the safety of the pilot, but also the safety of the vehicle being flown.

Before each research flight, NASA pilots conduct a preflight briefing. It is literally a tabletop rehearsal of the research mission that will ensure all project and support personnel are prepared and familiar with every phase of the flight, and that research data will be received, displayed and recorded as planned. The briefings include communications procedures, aircraft status reports from maintenance personnel, and weather conditions in the operating area. At the conclusion of the briefing, the final fly-no-fly decision rests with the research pilot.

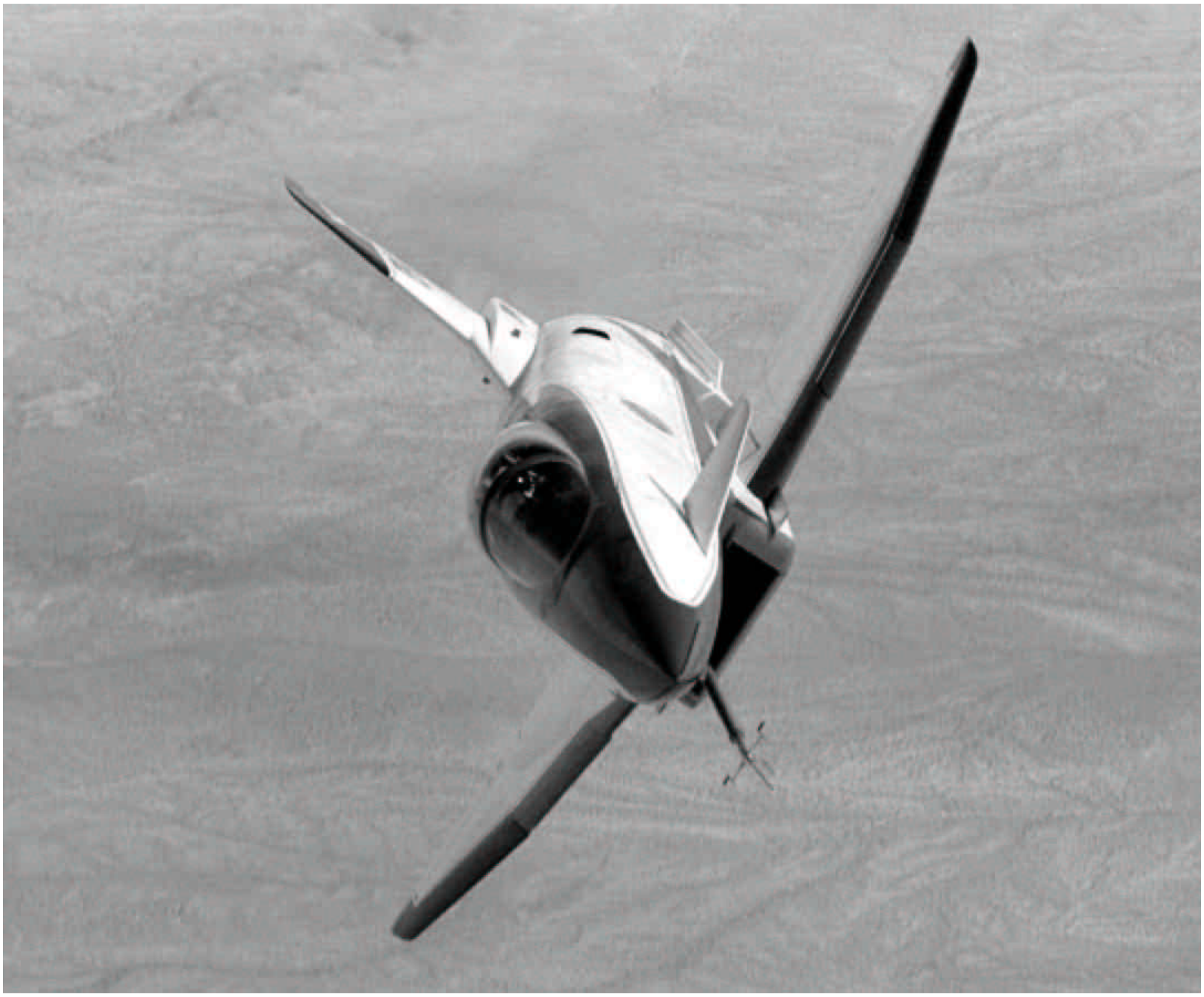
Research flights are planned in a progressive manner, with each successive flight drawing from data gathered on the previous flight. During the flights, NASA pilots — acting as both engineer and pilot — are in constant voice contact with engineers and researchers on the ground to make sure that telemetry data is being collected and the flight plan is followed. The flight plan is printed on a set of flight cards, which is a sequence of the test points and flight events. The flight cards also contain emergency procedures the pilot would follow if a serious problem occurred jeopardizing the mission, pilot safety or the aircraft.

Following each flight, the pilots hold a debrief meeting that is usually attended by the same project and support people who participated in the preflight session. The pilots systematically cover every phase of the flight, from takeoff to landing, with detailed discussions of each event, test point and research activity. The success of the mission, from the viewpoint of the pilot and project management, influences planning for the next flight. Detailed pilot reports and evaluations following each flight become part of the project record and help engineers and researchers make decisions about the design or operation of the aircraft. These reports become valuable lessons learned resources.

Research pilots also fly as chase pilots. A chase pilot accompanies the research pilot in another aircraft and becomes an important set of eyes and ears during the research mission. Chase pilots are in constant radio contact with the research pilot and ground controllers, and monitor test events and activities that cannot be seen from the research aircraft.

When a research mission must be photographed, chase aircraft become camera platforms. Photography — still, motion picture, and video — is used extensively by engineers to monitor and verify planned events that occur during flight. Recent and future photo chase aircraft will document the Access to Space experimental vehicles. Photography becomes part of the historical record of the project, and ultimately the historical record of NASA.

The F-15B Research Testbed is used to make in-flight experiments investigating a variety of aerospace topics including aerodynamics, instrumentation and propulsion.



This X-31 is one of the experimental research aircraft that NASA pilots have flown at Dryden.

Education and Experience

Individuals seeking a career as a NASA research pilot must possess a bachelor of science degree in engineering, physical science, mathematics or computer science. Some of the research pilots have also graduated from a military or other recognized test pilot school, or have test pilot experience by participating in actual performance flying qualities flight test.

At the time of application, future research pilots must have a minimum of 1,500 hours as the pilot-in-command. They must also possess a current Federal Aviation Administration (FAA) commercial pilot license with an instrument rating, or a pilot and instrument rating from the armed services, and an up-to-date FAA first class medical certificate.

These minimum standards show that individuals seeking a career as a NASA research pilot are already experienced in research aircraft piloting techniques, have knowledge of control room operations and airspace utilization, possess the ability to interact effectively with project managers and engineers and have a familiarity with aircraft safety requirements.