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INFORMATION

FLIGHT RESEARCH

Flight Research Laboratory

The Flight Research Laboratory of the NRC Institute for Aerospace Research (NRC Aerospace) is located on the NRC campus adjacent to the Ottawa International Airport. With a highly trained scientific and technical staff possessing specialized knowledge in the area of experimentation in flight, the Laboratory develops, maintains and operates a small fleet of highly specialized research aircraft and other facilities to address its scientific goals.

Research Programs

The Flight Research Laboratory cooperates with partners in the Canadian aerospace industry in the design, development, testing and evaluation of advanced aeronautical systems. It carries out independent and collaborative research to define improvements in design standards and operational requirements. It also works with various other government departments to advance the science priorities of the government, including those related to global warming, climate change and the Kyoto Accord. The Laboratory performs research under three specific programs.

The Airborne Research Program uses the aircraft fleet to measure the atmosphere and world around us. Aside from major projects with partners and collaborators to gather data on specific phenomena, such as icing and other environmental hazards to aviation, or the measurement of magnetic anomalies for resource detection purposes, researchers within the program pay special attention to the development of new ways to use aircraft-based sensing to meet the needs of scientists and researchers.

The Flight Mechanics and Avionics Program concentrates its efforts on the study of the aircraft, the pilot, and the interaction between the two. Particular programs of flight test, aircraft performance, stability and control, cockpit technologies and human factors are found within this program.

The Flight Recorder Playback Centre performs work to advance the safety of aircraft operations through the use of flight recorded data. This program also performs data recovery work for the investigation of accidents and incidents. The Centre has complete capabilities for the playback and analysis of cockpit voice recorders, digital and analogue flight data recorders, air traffic control tapes and videotapes. It works closely with DND, Transport Canada, the Transportation Safety Board of Canada, and the aviation industry

Major aircraft facilities

To carry out its studies, NRC Aerospace maintains and operates a small fleet of aircraft that includes:

- a Bell 412 Advanced Systems Research Aircraft (ASRA)
- a Bell 205A Airborne Simulator
- a Bell 206 configured for night vision operations
- a Convair 580 multi-purpose flying laboratory
- a Twin Otter used for atmospheric sampling
- a Falcon 20 flight mechanics and microgravity research facility
- a Harvard Mark IV, and
- a T-33.

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Sample projects

The Laboratory flight tests aircraft to develop advanced mathematical flight models for use in sophisticated flight simulators built by CAE, Mechtronix and other manufacturers. Since 1998 over 20 such programs have been conducted, with the most recent programs being on the Cessna CJ and Citation X business jets, the Beech C-90 King Air and the Sikorsky S-76.

Using the NRC Falcon 20, Laboratory researchers are studying the effect of wet runways on aircraft takeoff and landing performance. This is a follow-on project from work concerning snow covered runways that was recently completed and resulted in the development and promulgation of the Canadian Runway Friction Index (CRFI).

The Laboratory's two primary flight mechanics research tools the Bell 412 ASRA and the Bell 205 are unique fly-by-wire helicopters that perform as airborne simulators to support flight dynamics and aeronautical technology studies, including research on enhanced vision systems and cockpit technologies. Developed in partnership with members of the Canadian aerospace industry, DND, and the federal research granting agency, NSERC, the Bell 412 ASRA is now being used to assess the handling qualities and performance of new control system designs. In a novel application of the same technology, the NRC Bell 205 is being operated as a surrogate Unmanned Air Vehicle (UAV) to study how civil UAVs can operate in public, non-segregated, airspace.

Using the NRC Convair 580 "flying laboratory", NRC researchers are collaborating with Environment Canada, Transport Canada, NASA, the major airframe manufacturers, and many other organizations to document the atmospheric conditions that lead to aircraft icing in order to develop better predictive models of the phenomena. Using the same aircraft, Laboratory researchers have developed a longstanding focus on airborne geophysics and resident expertise in aeromagnetics and aerogradiometry which has led to advances in aeromagnetic compensation and development of gradient magnetic methods, instrumentation and analysis. Its researchers have also acquired new abilities in hyperspectral imaging and are developing new sensing tools such as airborne dual wavelength Doppler radar for aircraft icing and cloud physics research, as well as for climate change studies.

Defence systems for remote sensing is another area of interest. In cooperation with the Department of National Defence, the NRC Convair-580 is used as the development platform for the Spotlight Synthetic Aperture Radar System, which is based on innovative Canadian technological advances and is fitted on the CP-140 long-range patrol aircraft.

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