

## **Falcon-20 Research Aircraft**

The Falcon-20 research aircraft at the National Research Council Institute for Aerospace Research (NRC Aerospace) is a multi-purpose platform currently used for two major research programs. Under the flight mechanics program, the NRC Falcon-20 is participating in a multi-year project to determine aircraft stopping performance characteristics on wet runways, and under the airborne science program, it is used as a microgravity (near freefall) research platform. With an extensive onboard data acquisition system, the aircraft can also be used for airborne geoscience studies, avionics research, and aircraft-based sensor research.

### **Research partnerships**

NRC acquired the Falcon-20 from the Department of National Defence (DND) in 1991. In partnership with the Canadian Space Agency (CSA), the aircraft was originally instrumented to support microgravity research, with aircraft fuel and hydraulic systems modified to enable it to fly “zero” G parabolic manoeuvres. An engine oil replenishment system is currently being designed to extend the number of parabolas per flight.

In partnership with Transport Canada (TC), the Falcon-20 flight guidance systems were modified to enable curved path (area navigation) procedures to be flown using signals from the microwave landing system (MLS) and the global positioning system (GPS). This evolved into a multi-year program with NAV CANADA and the FAA using the NRC Falcon-20 as a test-bed to help develop the GPS constellation as a fully certified guidance source for precision instrument approaches up to Category III standards.

### **Future roles**

NRC Aerospace has developed the Falcon-20 as a general purpose fixed-wing flight mechanics and airborne science research facility. Modifications made to the aircraft



*NRC Falcon 20*

systems to support past projects are all retained for potential future projects. The aircraft data acquisition system has been upgraded, and a heads-up-display (HUD) has been integrated into the co-pilot's station to support future research pertaining to enhanced vision systems.



*Heads Up Display installed on the NRC Falcon 20*

The Falcon-20 can support a wide variety of avionics and airborne sensor research projects of interest to the Canadian and international aerospace and airborne geoscience communities.

One of the newest in the NRC research aircraft fleet, the Falcon-20 is backed by solid experience in flight testing and airborne experimentation. Clients can count on the knowledge and expertise at NRC Aerospace to address a broad range of research challenges.

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## Technical specifications

Research aircraft:	<ul style="list-style-type: none"><li>• Falcon-20 twin engine, mid-size business jet</li></ul>
On-board installations:	<ul style="list-style-type: none"><li>• Engineering workstation containing PC computer, display and interface with data acquisition system</li><li>• Data acquisition system based on VME MVE167 digital computer, with dual removable hard disk recording medium</li><li>• Multiple navigation sensors (VOR, ILS, GPS) and avionics including HUD, TCAS, TAWS, RVSM in progress</li><li>• Honeywell HG1700 IRU, real-time flight test differential GPS, modified flight director</li><li>• Local area network to communicate between various computers such as PC, VME, HG1700, HUD</li><li>• Modified fuel and hydraulic systems for microgravity conditions (engine oil replenishment in progress)</li></ul>
Project power:	<ul style="list-style-type: none"><li>• 28V DC 125 A</li><li>• 115V AC 60Hz 1Ph 2KVA</li><li>• 115/26V AC 400Hz 1Ph 1KVA</li><li>• Aft cabin AC and DC power outlets</li></ul>
Data analysis:	<ul style="list-style-type: none"><li>• PC-based data playback and analysis system (including software for time and frequency analyses)</li></ul>
Measurement capabilities:	<ul style="list-style-type: none"><li>• 3-axis accelerations and rates</li><li>• Aircraft attitude and heading</li><li>• 3-D positions and velocities</li><li>• Static and dynamic pressures</li><li>• Outside air temperature</li><li>• Flight director system signals</li><li>• 64 channel A/D capability (16 client channels available)</li><li>• 8 programmable D/A channels</li><li>• 8 RS232 I/O ports</li></ul>
Special configurations:	<ul style="list-style-type: none"><li>• As required</li></ul>

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